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# USSR Report

## ENERGY

No. 157





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OIL AND GAS

# BETTER DRILL-PIPE DEFECTOSCOPY EQUIPMENT NEEDED FOR FAR NORTH

Moscow NEFTYANIK in Russian No 4, Apr 83 pp 17-18

[Article by Yu. Mikhaylov and S. Kekukh: "Ultrasonic Defectoscopy in the North"]

[Text] The vigorous development of drilling operations in the northern and eastern parts of the country have caused the emergence of a number of technical problems associated with insuring the efficiency of equipment and monitoring resources, particularly ultrasonic apparatus for the defectoscopy of drill pipe and load-lifting equipment in places where temperatures are low. Because of this, scientific organizations are creating new mobile means for defectoscopy and are sending them out to be put into production, but several test installations (the Zond of IFING [Ivano-Frankovsk Gas and Oil Institute], the KD1OP of the Poltava Department of UkrNIGRI [Scientific-Research Institute for Geological Exploration] and the UDP-1 of the Ivano-Frankovsk Section of VNIIBT [All-Union Scientific-Research Institute for Drilling Technology]) cannot be considered to have met the requirements of enterprises for apparatus for nondestructive monitoring. Therefore, production enterprises have been forced to use the series-produced PKDL-1 and PDU-1M laboratories, which have not been adapted to operation in regions difficult of access and whose output, incidentally, lags greatly behind the growth in requirements for apparatus for the defectoscopy of pipes and equipment. For work in regions that are difficult of access, the equipment of these laboratories usually is disassembled and used in the form of home-made portable sets, and it is installed on GAZ-71 all-terrain vehicles or it is deployed in KUNG-type shelters, which are transported by helicopter.

Yamalneftegazgeologiya [Yamal Oil and Gas Geology Association] is now operating a portable KD-1OP set, two home-made portable sets made up of the PKDL-1 and one set based upon the PKDL-1, in a variant that is hung from a helicopter and can be installed in a shelter on a Ural motor-vehicle which has increased cross-country travel capability, or the ZIL-131. It is much more suitable, of course, to use portable sets of apparatus because of the high cost of transporting shelters by helicopter, but then the operators' working conditions and the operation of the apparatus are better by far in the latter case.

Special attention should be paid to protecting portable defectoscopes from environmental effects and also from the vibration and blows of transport. For this purpose, sealed protective housings and shock-absorbing padding made, for example, of sponge rubber, which covers the bottom of the containers, are used. The housing protects against moisture, snow, spray solutions and overcooling during operation. Thanks to the warmth that is given off by the instruments, an above-zero temperature is maintained inside the protective housing, which allows access only to the face panel of the DUK-66 or the UDM-3 defectoscope when the outside-air temperature is on the order of -40 degrees C.

The portable set that is used in the Gydansk NGRE [Oil and Gas Exploration Expedition] includes the UDM-3 defectoscope and UD-2 attachment for automatically maintaining the level of the bottom signal when monitoring the drill pipe (designed by Chernigovneftegazgeologiya [Chernigov Oil and Gas Geology Association], jointly with the PO [Poltava Department] of UkrNIGRI), the LATR-1M automatic transformer, an analyzer, a ZIP [spare-parts set] with a collection of scanners, 2-3 pipe carriages and a set of high-frequency and power cables. The metal container has dimensions of 800x380x500 mm, and it weighs 40 kilograms. With the use of the DUK-66 defectoscope, the set includes a second container 750x480x370 mm, the total weight being about 100 kilograms. The set provides for monitoring of the round-trip equipment and for defectoscopy of the upset part of the drill pipe and the thermal-effects zone of welded pipe joints and welded locks. With the use of the US-2 type pipe carriage, which was designed by the PO UkrNIGRI, defectoscopy is performed of the drill pipe's tool joint thread, UBT [weighted drill pipe] and subs in assembled form.

Water is used as the liquid that provides for acoustic contact between the ultrasonic scanner and the surface of the article being monitored, and, in rare cases, when monitoring parts with a coarsely machined surface, cup grease is used. In the winter, the water is heated by steam in a container (a GSM [fuel and lubricants] drum) to 60-90 degrees C, so that, at the carriage's outlet, the temperature is within the 20-30 degrees C. range. In this case, normal conditions are provided for sensor operation, and the operator can work without gloves. The necessary water temperature is maintained in the hose and at its outlet by changing average consumption: by reduction of the drain for strong heating of the water in the service tank, and by an increase for cooling. One 200-liter filling of the tank ordinarily is enough for defectoscoping 2,000 meters of pipe when the tools are raised from the wells, that is, about 40 liters are consumed per hour. In order to create the required head, the drum is installed on the pipe setback (on the BU-125 installation), or it is hung from a girt of the derrick (the Uralmash-3D, BU-80 and others). During mild freezes, the water is usually fed from the drilling service tank without additional heating. On the derrick's receiving platforms the pipe ends are warmed by steam, and the drum is set directly upon the pipe being monitored.

During the winters of 1980-1982 the Gydansk NGRE alone checked about 15,000 meters of drill pipe, more than half of it at temperatures below -30 degrees C. The lowest air temperature at which pipe defectoscopy was carried out was -50 degrees.

The experience of Yamalneftegazgeologiya and some other enterprises in introducing defectoscopy in the Far North puts in doubt the assertion of representatives of the Ivano-Frankovsk Institute for Oil and Gas (I. Migal' et al, NEFTYANIK, Moscow, No 6, 1982, p 16) that the problem of creating an acoustic contact with the water at low temperatures has special urgency. Apparently a problem arose as a result of the design peculiarities of the Gnom-type pipe carriages for the Zond installations, in which water is fed through metal tubes about 20 centimeters long for the prism of the carriage. Naturally, in order to prevent the water's freezing in these tubes, substantial consumption was necessary--0.2 cubic meters per hour, as the authors of the above-indicated article point out. For normal operation during deep cold, the metal connections for feeding water to the prism of the carriage must be excluded entirely, since the water freezes first of all in these connections. Materials with low heat conductivity should be used for manufacturing the connections; then it will be possible to decrease water consumption to 25-30 liters per hour.

An intensive buildup in pipe defectoscopy volume and the conduct of monitoring regardless of weather affect positively the association's main operating indicators. Thus, during 1981 not one pipe breakdown occurred on the part of the elements being monitored, enabling an economic benefit of 290,000 to be obtained above 1980's.

The Laboratory of Nondestructive Monitoring Methods of the Poltava Department of UkrNIGI, with which an agreement for scientific and technical collaboration has been concluded and is being implemented successfully, is extending great assistance to the association in mastering defectoscopy equipment and methods.

However, effectiveness in preventing drill-pipe breakdowns is greatly reduced because of the lack of technical equipment for defectoscopy that is adapted to work in the severe climate of regions of the country that are difficult to reach. In particular, up to now series production has not been arranged for the portable KD-10P defectoscopic apparatus, the ED-4P electromagnetic defectoscope for monitoring the continuousness of pipe formed in fourbles for round-trip operations, the MT-2F thickness gage for steel drill pipe with a passageway sensor, and pipe carriages of new design, primarily the US-2, for monitoring tool joints in the nondetached state, which greatly exceeds the monitoring reliability of all known models of pipe carriages. A large portion of these development of the PO UkrNIGRI were exhibited at the VDNKh UkSSR [Ukrainian SSR Exhibition of Achievements of the People's Economy], and they were successfully tested and operated within UkSSR Mingeo [Ministry of Geology] associations; however, the manufacture of these effective and badly needed means for defectoscopy (except for the KD-10P) still has not been planned, because of a lack of ;capacity.

Scientific organizations of several ministries are involved in developing means for defectoscopy of drilling equipment and petroleum-grade pipe. The time has come when it is urgently necessary to make interagency comparison tests of test models of these instruments and installations under the conditions of the North, to determine the most perfected and reliable designs, and to begin to manufacture them in industrial series, in order to provide drilling enterprises with modern means of defectoscopy.



11409
CSO: 1822/259

ARTICLE SYNOPSES IN NEFTYANAYA I GAZOVAYA PROMYSHLENNOST', APRIL-JUNE 1983

Kiev NEFTYANAYA I GAZOVAYA PROMYSHLENNOST' in Russian No 2, Apr-Jun 83 p 56

UDC 553.98.001.18(477.52-16)+622.241

## FORECASTING OF DEPTHS DURING WELL DRILLING

[Synopsis of article by G. Sh. Chernysh in NEFTYANAYA I GAZOVAYA PROMYSHLENNOST' in Russian No 2, 1983 pp 10-11]

[Text] The regional consistency in change of depths of deposition of a number of stratigraphic surfaces in the log of sedimentary strata of the Carboniferous epoch is disclosed, based upon an analysis of the reserves of wells in various areas of the northwestern portion of the DDV [Dnepr-Donetsk depression]. A series of graphs and regression equations that reflect the established consistency are cited, and a methodology for using them to forecast depths of touchdown of the stratigraphic horizons, including productive ones, during well-drilling is described. 2 illustrations, 2 references.

UDC 553.98.061.7(477.4/5)

## QUICK METHOD FOR SINGLING OUT FLUID RESTS AND FALSE CAP ROCKS

[Synopsis of article by B. P. Kabyshev, D. I. Chuprynin and Z. P. Shevyakova in NEFTYANAYA I GAZOVAYA PROMYSHLENNOST' in Russian No 2, 1983 pp 12-14

[Text] A quick method for singling out fluid rests and false cap rocks of oil and gas in Upper Viseyan sediments of the DDV [Dnepr-Donetsk depression], based upon the use of statistical differences between the values of five parameters of geophysical study of wells, is described. Nomograms of discriminant decision functions for singling out fluid rests and false cap rocks are constructed, separately for oil and gas. The method can find wide application when developing three-layer models of UV [hydrocarbon] traps. 2 illustrations, 6 references.

UDC 551.8(477.8)

CHARACTERISTICS OF DISTRIBUTION OF SANDY MATERIALS OF VYGODSKAYA SUITE

[Synopsis of article by Z. V. Lyashevich, L. M. Kuz'mik and I. I. Shturmak in NEFTYANAYA I GAZOVAYA PROMYSHLENNOST' in Russian No 2, 1983 pp 18-19]

[Text] Based upon a study of the data of electrical logging of the external shape of sandy formations of the Vygodskaya suite, a hypothesis is made about sedimentation thereof under delta conditions. The causality of the extremely nonuniform distribution of oil and gas reserves in these sands is examined, and it is recommended that the peculiarities of morphological inhomogeneity of the reservoirs that have been discovered be used for a quantitative assessment of the forecast of the presence of oil and gas. 1 illustration, 4 references

UDC 622.24.051.73

HYDRODYNAMIC MULTICHAMBER ACTIVATOR

[Synopsis of article by V. F. Gorskiy, P. V. Gorskiy and Ye. I. Zhmurkevich in NEFTYANAYA I GAZOVAYA PROMYSHLENNOST' in Russian No 2, 1983, pp 23-26]

[Text] The design and operating principle of the GDA-1 hydrodynamic multiple-chamber activator are described, and a formula for determining its productivity is cited. The technology of obtaining lightweight gel-cement [gal'tsement] plugging solutions with a density of 1,300-1,500 $kg^3/m$ is described as an example of its use. 3 illustrations, 3 tables, 2 references.

UDC 622.24.053

RUNNING OF DRILL PIPE ON CURVED PORTIONS OF WELL BORES

[Synopsis of article by Yu. V. Dublenich, V. M. Ivasiv and R. D. Tychinskiy in NEFTYANAYA I GAZOVAYA PROMYSHLENNOST' in Russian No 2, 1983 pp 27-28]

[Text] Results of the industrial introduction of recommendations on the running of drill pipe at intervals of sharp change of the three-dimensional position of the axis of the wellbore are cited. The effectiveness of a mathematical method for determining the durability of drill strings with a prescribed probability of nondestruction during rotary drilling is indicated. 4 references.

UDC 622.279.23/4

GRAPH-ANALYTIC METHOD FOR COMPUTING CONDENSATE RECOVERY DURING DEVELOPMENT OF DEPOSITS

[Synopsis of article by V. S. Grigor'yev in NEFTYANAYA I GAZOVAYA PROMYSHLENNOST' in Russian No 2, 1983 pp 29-32]

[Text] An original method is set forth for determining the condensate yield of gas-condensate deposits during development thereof to depletion under a

dissolved-gas drive, taking into account the actual properties of the formation's gas-condensate mix and change in the volume of the gas-saturated bed, which increases the accuracy of forecast calculations of condensate recovery. Convenient and simple expressions for calculating condensate recovery of the beds and bed losses of condensate during pressure reduction are obtained. A new analytical function is established between the specific potential content of the condensate in the bed's gas and losses thereof as a result of differential isothermal condensation. 2 illustrations, 1 table, 3 references.

UDC (665.765-404.9:621.832):665.7.038.2

INFLUENCE OF VISCOSITY OF DISPERSING MEDIUM ON PROPERTIES OF LUBRICANTS

[Synopsis of article by M. N. Serednitskaya, G. I. Cherednichenko and T. G. Sokolova in NEFTYANAYA I GAZOVAYA PROMYSHLENNOST' in Russian No 2, 1983 pp 47-49

[Text] The influence of the viscosity of a dispersing medium on the properties of hydrated calcium lubricant was studied in the example of a synthetic solid oil. It was shown that raising the viscosity of the oil where the hydrocarbon content is constant does not affect lubricating-quality indicators. At the same time, the use of uniformly viscous oil bases of different group content leads to a sharp change in solid-oil properties. It was established that the viscosity of an oil does not exert an essential influence on the quality indicators of a hydrated calcium lubricant, and the hydrocarbon content of the dispersing medium is determining. 3 tables, 4 references.



11409
CSO: 1822/258

## ERGV-630-9/0.5 ROTOR EXCAVATOR DESCRIBED

Kiev UGOL' UKRAINY in Russian No 6, Jun 83, inside back cover and back cover

[Advertisement]

[Text] The ERGV-630-9/0.5 excavator is designed for mining lignite and coal that includes rock intercalations, other useful minerals and strip overburden rock in strip mines with loading the rock on a coveryor, as well as RR and motor vehicle transport.

The ERGV-630-9/0.5 is equipped with a centrifugal actuator.

The excavator can work the stope with vertical and horizontal shavings, face and side progress cycles and mine minerals selectively in structurally complex stopes. The ERGV-630-9/0.5 excavator is stable and works reliably under complicated geological mining conditions at air temperatures from +35 to -40°C.

Most of the laborious auxiliary processes on the excavator are mechanized.

Air conditioning and air purification systems in the control cabs and rest rooms provide optimal working conditions for service personnel.

The ERGV-630-9/0.5 excavator is manufactured by the Donetsk Machine Building Plant imeni Leninskiy Komsomol Ukrainy.

ERGV-630-9/0.5 specifications

| | |
|---|---|
| Theoretical productivity in loose ground at unit digging forces, $m^3$/hour: | |
| 1.0 megapascal | 1300 |
| 2.1 megapascal | 690 |
| Maximum weight productivity, ton/hour | 1500 |
| Rotor diameter, m | 3.2 |
| Number of buckets, units | 8 |
| Bucket capacity, liters | 140 |
| Rotation frequency, per minute | 34 |
| Height of work ledge maximum, m | 10 |
| Digging depth, m | 0.5 |
| Width of conveyor belt, mm | 1000 |

Specifications (Cont'd)

| | |
|---|---|
| Velocity of conveyor belt, m/second: | |
| receiving | 4.0 |
| unloading | 4.5 |
| Velocity of machine, m/hour | 355 |
| Allowable slope, degrees: | |
| when digging | 3 |
| when transporting | 7 |
| Average unit pressure on the ground, megapascals | 0.126 |
| Feed voltage, kilovolts | 6 |
| Installed power of high voltage electrical equipment, kva | 730 |
| Excavator weight, tons | 305 |



2291
CSO: 1822/257

SYNOPSES IN UGOL' UKRAINY, JUNE 1983

Kiev UGOL' UKRAINY in Russian No 6, Jun 83 pp 47-48

UDC 622.268.13

## VELIKOMOSTOVSKAYA-KONSOMOL'SKAYA NO 8 MINE. ACCELERATED TUNNELING WITH COMBINES AT VELIKOMOSTORSKAYA-KOMSOMOL'SKAYA No 8 MINE

[Synopsis of article by V. N. Garashchuk, F. N. Salyutenko, pp 2-3]

[Text] Work experience of S. G. Semenchuk's tunneling brigade in the Velikomostovskaya-Komsomol'skaya No 8 mine of the Ukrzapadugol' Association. Organization of labor, technical economic indicators. Obligations and execution. 2 illustrations.

UDC 622.232: 658.387.4

## VELIKOMOSTOVSKAYA MINE NO 9 ADVANCED WORKING METHODS IN LONGWALLS WITH DAILY LOADING OF MORE THAN 1000 TONS PER DAY

[Synopsis of an article by V. N. Gusakov, pp 3-5]

[Text] Technical economic indicators of a longwall equipped with a KM-87 complex. Work organization in A. M. Veretyuk's brigade. 3 illustrations.

UDC 622.01: 658.387.658.5

## ORGANIZATION OF LABOR AND PRODUCTION AT MINES IMENI CHELYUSKINTSEV

[Synopsis of article by V. V. Pudakov, pp 5-7]

[Text] Work conditions and organization of labor at mine imeni Chelyuskintsev. Technical economic indicators and problems. 2 illustrations.

UDC 622.232: 658.387.4

EXPERIENCE OF REACHING 1000 TONS LOADING AT LONGWALL AT MINE IMENI MEL'NIKOV

[Synopsis of article by V. P. Biryukov, B. L. Borovik, pp 7-8]

[Text] Technical economic indicators of wall equipped with KM-87DN complex at mine imeni Mel'nikov of the Lisichanskugol' Association.

UDC 658.387.62: 622.01

WORK AT SECTION NO 2 at SVETOPOL'SKAYA MINE OF THE ALEKSANDRIYAUGOL' ASSOCIATIONS

[Synopsis of article by M. I. Mudrets, pp 8-10]

[Text] Organization of labor at advanced mining section No 2 by A. R. Slobodyan. 1 illustration.

UDC 622.838.55

LOW WASTE TECHNOLOGY IN MINING COAL AT DONBASS

[Synopsis of article by Ye. V. Belyayev, pp 11-12]

[Text] Model of mine for working gently sloping seam with low waste technology under Donbass conditions. 2 tables. 2 illustrations. 4 references.

UDC 622.831.325: 622.861

EFFECT OF ROOF CONTROL ON DANGER OF OUTBURST OF THE SEAM NEAR THE STOPE PART

[Synopsis of article by S. N. Aleksandrov, B. I. Prokhorov, L. G. Stepanovich, pp 13-14]

[Text] Numerical criteria for evaluating the outburst danger of the seam near the stope part; method for evaluating the size of the zone of the outburst effect on the longwall depending upon the method of roof control. 2 illustrations.

UDC 622.267.5.082

ACCELERATING TUNNELING OPERATIONS IN SEAMS THAT ARE PRONE TO OUTBURSTS

[Synopsis of article by I. I. Sushko, pp 14-15]

[Text] Methods for tunneling drifts at Donbass mines using existing and newly developed antioutburst measures; laboriousness of their execution. Determination of speed of drift tunneling using various antioutburst measures and methods for mining coal at the stope. 1 table.

UDC 622.815: 622.834

COMBATTING OUTBURSTS OF COAL, ROCK AND GAS. SOME SOLUTIONS.

[Synopsis of article by O. A. Kolesov, M. I. Bol'shinskiy, pp 16-18]

[Text] Safety conditions when working seams and sandstones in danger of outbursts. Basic directions for solving the problem of safe and efficient working of seams dangerous from the standpoint of outbursts. New methods for forecasting outburst-prone zones and preventing outbursts of coal, rock and gas, and devices and machines for their execution. 5 illustrations.

UDC 622.831.322.03

DEGASSING OF OUTBURST-PRONE STEEP SEAMS

[Synopsis of article by V. I. Kucher, pp 18-19]

[Text] Results of statistical processing of experimental data on measuring gas pressure in outburst-prone seams, lying in the zone of unloading from the rock pressure after the extraction of the protective seam. Three areas of the unloading zone: natural degassing, gas conservation and intensification of the gas yield from the seam. Proposals on using artificial degassing of wells. 2 illustrations.

UDC 622.454: 621.643 (477.61/.62)

NEW METHOD FOR VENTILATING MINES BY PIPELINES

[Synopsis of article by Yu. K. Batmanov, A. G. Lepikhov, M. A. Moiseyev, V. I. Shevtsov, pp 20-22]

[Text] Status of question on ventilation methods of highly gaseous mines and its urgency. Method for ventilating mines by pipelines, ventilation parameters, advantages and area of application. 1 table. 3 illustrations.

UDC 622.831.322

REDUCING THE GAS DISCHARGE TO THE DIAMETER OF THE BORE HOLE WHEN FORECASTING OUTBURST DANGER

[Synopsis of article by V. S. Zykov, p 22]

[Text] Current forecasting of outburst danger in preparatory drifts using the initial speed of gas discharge, reduced to the design diameter of the monitoring bore hole. Analysis of experimental observations.

UDC 66.067.322: 622.01

MINE WATER TREATMENT WITH TWO-STAGE FILTRATION

[Synopsis of article by Ye. V. Grigoryuk, B. A. Semenenko, O. V. Grishchenko, p 23]

[Text] Laboratory and industrial investigations of extensive purification of mine waters by a two-stage filtration method. Filter for two-stage filtration and results of its tests. 1 illustration.

UDC 622.271

USING TRANSPORTATION STACKING PLATFORM COMPLEXES IN STRIP MINING

[Synopsis of article by V. I. Shestakov, pp 24-25]

[Text] Use of transport stacking platform complexes in strip mines of the Aleksandriyaugol' Association. Recommendations for efficient use of the complexes. 1 table. 1 illustration.

UDC 678.026: 551.34: 622.01

SOLID POLYMER COATINGS TO PREVENT ROCKS STICKING AND FREEZING TO EQUIPMENT

[Synopsis of article by V. V. Vasil'yev, M. P. Dunayevskaya, V. Ya. Medvedeva, pp 25-26]

[Tect] Use of hard polymer coatings to prevent rock and coal from sticking and freezing to the surface of mine transporting equipment. Tests of polymer materials for solid coatings and their efficiency. 1 table. 1 illustration.

UDC 658.27: 622.33

UTILIZING FIXED CAPITAL AT MOROZOVSKIY STRIP MINE

[Synopsis of article by V. S. Militsina, P. N. Ratushnyak, pp 26-27]

[Text] Evaluation of efficiency of utilizing the fixed capital of the Morozovskiy strip mine of the Aleksandriyaugol' Association. 1 table. 1 illustration.

UDC 622.28: 622.012.2 (477)

IMPROVING SUPPORTS -- BASIC RESERVE FOR RAISING THE LABOR PRODUCTIVITY OF MINE TUNNELING

[Synopsis of article by Ye. A. Lopukhin, pp 27-29]

[Text] Modern methods for supporting drifts and vertical shafts when building and modernizing Donbass mines. 1 table.

UDC 622.333.013: 658.386.3

PLANNING TO INCREASE THE SKILLS OF MANAGERS AND SPECIALISTS IN THE COAL INDUSTRY

[Synopsis of article by V. V. Domrachev, T. L. Mironova, pp 29-30]

[Text] Method for developing a plan to increase the skills of managers and specialists in the coal industry.

UDC 338: 409.12: 622.01

METHODOLOGICAL PROBLEMS OF DETERMINING THE LEVEL OF UTILIZATION OF PRODUCTION CAPACITIES OF MINES

[Synopsis of article by P. P. Chumachenko, E. N. Bochkareva, E. V. Rylev, pp 31-32]

[Text] Determination of norm and actual levels of production capacity utilization in mines. Problems of correlation between production capacity utilization and execution of planned tasks. proposals on improving the calculations and economic substantiation of the production capacity and determination of norm coefficients and the actual levels of their utilization in mines.

UDC 69.003: 658.152: 622.01

CALCULATION OF THE ECONOMIC EFFECT OF REDUCING THE PERIOD OF BUILDING FACILITIES IN THE COAL INDUSTRY

[Synopsis of article by T. S. Pichugina, pp 32-33]

[Text] Method for calculating the economic effect of reducing the construction period of mines and enriching factories.

UDC 624.001.572: 622.01

MODEL OF OPTIMAL ORGANIZATION OF ERECTION OF MINING FACILITIES

[Synopsis of article by S. A. Pichugin, P. Yu. Baranov, p 34]

[Text] Economic-mathematical bases for forming a model in selecting the optimal organization-technological version for erecting a mining facility.

UDC 622: 33.012

EXPANSION OF AREA OF USING MECHANIZED SUPPORTS OF MINING COMPLEXES

[Synopsis of article by V. I. Kravtsov, V. Ya. Sporykhin, N. P. Tkalenko, p 35]

[Text] Results of investigation of mechanized operation of complexes under Donbass conditions. New design solutions of hydraulically operated supports.

UDC 622.232.72.006.354

MODERNIZATION OF THE 4PP-2 COMBINE

[Synopsis of article by G. A. Nedzvetskiy, V. P. Serdyuk, B. M. Borisenko, p 36]

[Text] Tunneling characteristics of the 4PP-2m combine and its difference from the 4PP-2 tunneling combine. Test results. 1 illustration.

UDC 622.284.54

DEVICE FOR INCREASING THE PRELIMINARY SETTING OF MECHANIZED SUPPORTS

[Synopsis of article by I. A. Grigor'yev, V. I. Alifanov, p 37]

[Text] UPD device for increasing the preliminary setting of mechanized supports. Efficiency of its use. 1 illustration.

UDC 622.232.72

BRAKING DEVICES WITH CHAINLESS FEED FOR MINING COMBINES

[Synopsis of article by D. A. Korolev, V. N. Briling, V. A. D'yakov, pp 38-40]

[Text] Analysis and development of promising methods of braking devices for combines with chainless feed. 6 illustrations.

UDC 622.765.06

USE OF COLLECTOR REAGENTS IN VAPOROUS STAGE WHEN FLOATING COAL SLUDGE

[Synopsis of article by N. D. Ogloblin, A. I. Samoylov, I. Vidlazh, pp 40-41]

[Text] Results of tests of technology developed by the Donetsk Polytechnical Institute for preparing collector reagents when floating coal sludge. 3 tables.

UDC 622.74: 622.271

GRIZZLY VIBRATION SCREENS FOR RELOADING POINTS AT STRIP MINES

[Synopsis of article by V. M. Berlin, A. B. Kanibalovskiy, p 42]

[Text] Function, design, technical characteristics and application area of type GK grizzly vibration screens. 1 table. 1 illustration

UDC 622.1: 528.53

WHAT GONIOMETER IS NEEDED BY DONBASS SURVEYORS

[Synopsis of article by E. G. Reysher, pp 43-44]

[Text] Analysis of questionnaire results by VNIMI [All-Union Scientific Research Institute of Mining Geomechanics and Surveying] for the purpose of developing a modern model of a goniometer for surveying longwalls in thin gently-sloping seams.

UDC [624.131.43: 552.16]: 622.272 (477.62)

RELATIONSHIP BETWEEN PHYSIOMECHANICAL PROPERTIES OF MESO-CARBONIFEROUS ROCK TO CATA- AND METAGENETIC ACTIVITY.

[Synopsis of article by V. L. Sverzhevskiy and L. A. Karnaukhova, p 44]

[Text] Relationships between indicators of physiomechanical properties of Meso-Carboniferous rock and their cata- and metagenesis. Refinement of zone boundaries between the initial, extensive catagenesis and initial metagenesis. 1 illustration. 1 reference.



2291
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## CEMA COOPERATION IN CONSTRUCTION OF GES-GAES

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 3, 1983 pp 22-24

[Article by Leren Mikhaylov, Candidate of Technical Sciences, director, "Gidroproyekt" Institute, and Taras Dotsenko, chief engineer, "Gidroproyekt" Institute]

[Text] CEMA member countries have been cooperating closely and with mutual profit in constructing hydraulic power plants within the framework of Section 3 on hydroelectric plants of the CEMA Standing Committee on Cooperation in the area of electrical energy since it was first organized.

Practically all of the important aspects of the development of hydroelectric power and the integrated utilization of the water resources of the CEMA member countries and Yugoslavia, as well as the paths of scientific and technical progress in creating GES [hydroelectric plants] and GAES [pumped-storage electric power plants] have recently been examined. The activity of this section can be divided arbitrarily into three phases, with each subsequent phase being based on the results of previous cooperation, allowing for the development of the most urgent newly arising problems.

During the first phase (1959-1970) the foundations were laid for cooperation in the area of hydroelectric construction. The foremost item in this phase was the development of a scheme for the integrated utilization of the water resources of the Danube River. Second only to the Volga in Europe, the Danube flows through the FRG [Federal Republic of Germany], the ChSSR [Czechoslovak Soviet Socialist Republic], the VNR [Hungarian People's Republic], the SFRYU [Socialist Federal Republic of Yugoslavia], the NRB [People's Republic of Bulgaria] and the USSR, with a significant extent (about 2,500 km) serving as an international boundary. The Danube is a water source for industry, the population and agriculture of the bordering countries. It serves as a very important transportation artery, and supports major fishing and reed harvesting activity. Steps are underway to control flooding and salinization of the soil. Finally, the Danube can serve as the source of inexpensive hydroelectric power.

Within the CEMA member countries and the SFRYU alone the main branch of the Danube can support a cascade of GES producing on the order of 5 million kilowatts with an average annual energy production exceeding 25 billion kilowatt hours. The tributaries of the Danube in the NRB, VNR, USSR and ChSSR can support GES and GAES with installed capacity of the order of 10.5 million kilowatts and annual electricity production of up to 22 billion kilowatt hours. Only 3.5 billion kilowatt hours, with a GES capacity of 1.1 million kilowatts, were utilized in 1960.

The Scheme for Integrated Utilization of the Water Resources of the Danube Basin developed by Section 3 made allowance for the fact that the requirements of water consumers and water users differ greatly, and in many cases are contradictory, as regards the regime of run-off of the river. The scheme has been refined as needed as national economic development plans have been implemented. As a result, the scheme has provided a good foundation for planning the development of water management and hydroelectric engineering in the bordering countries, and for establishing close bilateral cooperation, especially on border sections of the river. The "Dzherdap-Zheleznyye vorota"- the first water development (SFRYU and SRR) is now operating successfully, the "Dzherdap-II - Zheleznyye vorota-II" water development (SFRYU and SRR) is under construction, and plans are being developed for the "Gabchikovo-Nad'marosh" (ChSSR and VNR) and the "Nikopol-Turnu-Megurele" water developments (NRB and SRR). In addition, the exchange of information on scientific-technical achievements and coordination plans for the most important scientific research work within the framework of Section 3 has undoubtedly stimulated the development of mutual assistance and bilateral relations on the most complex specific scientific and technical problems. For example, Romanian and Yugoslavian specialists obtained deliveries of equipment and technical documentation from the USSR, as well as consultation and technical assistance from Soviet design and scientific research organizations on the broadest group of the design and construction of the "Dzherdap-Zheleznyye vorota" water development.

During the first phase of the activity of Section 3 the hydroelectric potential of the CEMA member countries and the SFRYU was evaluated, the plans for the utilization of water resources were correlated, the problems involved in GES construction were identified, the first joint research and development was done on individual themes, and a mutual exchange of information took place. This resulted in the development of the prospects for utilizing the hydraulic energy resources of the rivers of the CEMA countries from the viewpoint of power engineering, navigation, irrigation, land reclamation, etc.

The report entitled "Available Hydraulic Energy Resources of CEMA Member Countries and the SFRU, Their Current Condition and Planned Utilization" demonstrated that the hydraulic energy potential of the CEMA member

countries[1] and SFRYU are estimated at approximately 203 billion kilowatt hours of electricity annually, with an economic potential of 125 billion kilowatt hours. The report emphasized the major possibilities for continued development of hydraulic power engineering and water management in the CEMA member countries and the SFRYU on the basis of national programs as well as bilateral and multilateral cooperation.

The basic principles of technical and economic analysis in hydraulic power engineering were then developed, the possibilities of constructing economical GAES were investigated, and information on progressive achievements in the construction of concrete and rock dams, high pressure pipelines and underground GES structures was integrated, all within the framework of Section 3. This then served as the basis for formulating considerations regarding the technical specifications and design standards for the corresponding structures.

The second phase of the activity of the Section (1970-1980) was characterized by more purposeful joint actions on the part of CEMA member countries and the SFRYU in carrying out scientific research and developing specific proposals regarding cooperation in the construction and operation of hydraulic power installations and hydrotechnical constructions. A report entitled "Technical Progress in Design, Construction and Operation of Generating Installations and Networks of CEMA Member Countries and the SFRYU Up To 1980 and Basic Directions of Development Up To 1990" was prepared within the framework of the Committee, as well as a coordination plan for the most important scientific and technical research in the area of hydraulic power engineering for 1971-1975.

The influence of the extreme hydrometeorological conditions observed in various river basins on the design and operation of GES was analyzed, a method was developed for estimating the effect produced within an energy system with the use of GAES, and aspects of the flexibility and reliability of the GES and GAES in operation in the Consolidated Power System were generalized. The sizes of the hydropower resources which are economically justifiable for use were clarified in the CEMA member countries, and environmental protection measures were developed.

The specialists of Section 3 provided a major contribution to the preparation of a report on the future development of electric power engineering and consolidated power systems of the CEMA member countries up to 1980, to the development of the conception of long-range development of electric power engineering and the consolidated power system of the CEMA member countries and the SFRYU up to 1990, as well as the General Plan for the future development of the consolidated power system of the

[1] The only river basins included within the USSR are those which gravitate toward the Consolidated Power System of the CEMA member countries.

CEMA member countries up to 1990.

Appropriate stress was placed on the exchange of experience in using computers to solve research, design, construction and operation problems involved in hydraulic structures. This made it possible to increase the efficiency of developing and operating hydraulic power facilities and to ensure optimal GES and GAES operating conditions. Research was also done on optimizing their utilization, operation and control under the conditions of the consolidated power system. The basic principles for continued mobilization of hydraulic power resources and the prospects for development of GES, GES-GAES and GAES within the consolidated power system were defined. Aspects of the availability and flexibility of hydraulic power installations and optimal modes and methods of controlling GES and GES-GAES, allowing for the requirements of the consolidated power system and energy systems were examined under the conditions of integrated water management systems, optimization of plans and degree of automation and remote control of GES, GAES, GES-GAES and GES cascades.

On the basis of these investigations requirements were formulated for specific GAES equipment, for GES equipment and for special electrical equipment for GAES and peak GES considering the experience of the CEMA member countries and the SFRYU. These included reversible hydraulic machinery (basic indicators, guarantee and operating characteristics, construction of basic assemblies, model and full-scale testing, transportation and installation requirements), as well as fundamental electrotechnical equipment (technical requirements for overall conception of main electrical connection plan, the construction and parameters of the generator motor and block transformer, requirements for the switching equipment and guarantee values of basic electrotechnical equipment).

The detailed development of technical specifications served as the basis for establishing technical parameters which were agreed to by the parties to contracts for equipment delivery in preparing the construction of new GAES provided for in the long range national plans of the CEMA member countries for covering peak loads, and for GAES which were to be constructed on a multilateral basis.

The results of these developments were utilized in optimizing the operating modes of the "Batan" and "Sestrimo" hydroelectric plant cascades, in developing technical specifications for the delivery of the "Chaira" (NRB) GAES equipment, in creating the concepts of control of the "Nad'marosh" (VNR) GES units, for optimizing the operating modes of the "Markersbakh" GAES and "Gol'distal'" GAES (GDR), centralized control of GES cascades on the Bistritsa, the Ardzhesha and Olta Rivers (SRR) and in the control systems of the Krasnoyarsk and Botkinsk GES and the cascade of the mid-Dnepr GES (USSR), the "Cherny Vag" GAES, the "Gabchikovo" GES and the "Dlouge Strane" GAES (ChSSR) and in preparing the technical specifications for the equipment for the Zagorsk and Kayshyadorsk GAES (USSR).

Based on the integrated experience gained in operating GES and GAES as a whole, primarily their basic hydraulic power equipment and the specifications for it, the CEMA member countries and the SFRYU determined the requirements for power equipment for GES and GAES up to the year 1990. In order to ensure an accelerated program of hydraulic energy construction in the brother countries, proposals were put forth within the framework of Section 3 and the CEMA Standing Committee on Cooperation in the Area of Electric Power Engineering regarding setting up the production of hydraulic power and electrotechnical equipment for GES and GAES on the basis of specialization and cooperation.

During this phase the Section examined the feasibility studies for GAES which might be built in the NRB, VNR, PNR and SFRYU on the basis of multilateral cooperation among the interested countries. As a result, proposals were introduced concerning the possibility of constructing and operating GAES through the joint efforts of the countries in the capacity of system-wide facilities, and concerning the sequencing of the development of such GAES. Identified as priority facilities were the "Lakatnik" GAES in the NRB and "Predikalosek" in the VNR; the principles of joint construction and utilization of GAES as part of the consolidated power system were coordinated. The conditions for cooperation among the countries in constructing and operating the GAES were examined, and methodical foundations were developed for the states making up the consolidated power system to determine the economic effectiveness of their participation in joint construction of system-wide GAES. All of these issues were worked out within the framework of the temporary working group formed by the Committee and including participation of specialists from Section 3.

The third phase (since 1981) is characterized by a transition to more effective forms of cooperation, which provide significant economic effect. The plans call for continuing scientific and technical cooperation in developing the following:

-- proposals for improving existing technology for construction on the basis of integrated world experience in hydrotechnical construction;

-- technical specifications for technological construction processes, testing construction technologies in experimental production sections set up directly at construction sites;

-- technical requirements for industry for developing new high productivity high capacity special construction equipment for carrying out large volumes of hydrotechnical work rapidly;

-- requirements for special equipment for hydrotechnical construction for the years 1990 and 2000.

Work is continuing to identify those hydraulic power resources which are justified for use with allowance for specific existing national economic conditions in each country and the economic conditions in the world organic fuel market; work is also underway to construct system-wide GAES. Experiencing acceleration is progressive hydraulic power and electro-technical equipment for GES and GAES based on technical requirements and demands for it, as well as the implementation of microprocessor equipment in operating GES, GAES, GES-GAES and GES cascades.

A joint study of the possibilities of more rational utilization of the microhydroenergy potential, especially the creation of standardized types of equipment for low capacity GES with maximum automation, which is very promising and urgent for all CEMA member countries and the SFRYU, has recently been carried out within the framework of Section 3. Also underway is the development of rational configuration and construction approaches which will reduce the prime cost and material consumption of such GES and which will industrialize their construction. It has also been proposed that a program be set up to modernize existing GES in order to increase the degree of utilization of the hydraulic energy potential already in use.

The utilization of this potential increased from 13.8% in 1971 to 24.5% in 1972, or by a factor of 1.8. The installed power of GES increased by a factor of 2.7, and electricity production by a factor of 3.2. During the same period the installed power of GAES as a whole throughout the consolidated power system of the CEMA member countries increased by a factor of 3.8, and the production of electricity at GAES doubled.

Cooperation in the area of hydraulic power engineering thus continues to contribute importantly to the economic growth of the CEMA member countries. The development of hydraulic power engineering in the brother countries is characterized by a continuing growth in the production and consumption of electricity produced at GES and GAES and by improvement in their technical and economic indicators.

It has been proposed that work continue to define the trends of future development of hydraulic power engineering and to improve the technical level in designing, constructing and operating GES and GAES.



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# HYDROELECTRIC POWER CONSTRUCTION

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 3, 1983 pp 25-28

[Article by Mikhail Skladnev, candidate of technical sciences, director, All-Union Scientific-Research Institute for Hydraulic Engineering imeni B. Ya. Vedeneyev, Lev Zolotov, candidate of technical sciences, chief, Scientific Research Sector, "Gidroproyekt" Institute imeni S.Ya. Zhuk and Aleksandr Zhebrovskiy, department head, All-Union Scientific-Research Institute for Hydraulic Engineering imeni B.Ye. Vedeneyev]

[Text] Electric power engineering plays a leading role in accelerating economic and scientific-technical progress, and is the main factor behind the growth of productive forces in all branches of the national economy of the CEMA member countries and the SFRYU [Soviet Federal Republic of Yugoslavia].

The successful development of electric power engineering in these countries is promoted to a significant extent by socialist economic integration and multilateral connections within the framework of the CEMA Standing Committee on Cooperation in the Area of Electric Power Engineering.

One of the working agencies of the Committee is Section 3 on hydroelectric plants, which was created in 1959. The tasks of this section include coordinating development plans for hydraulic power engineering and the most urgent scientific and technical research in this area, and exchanging experience in designing the construction and operation of hydraulic power facilities, hydrotechnical structures and the consumption of water for thermal and nuclear power engineering.

Since its inception, the Section has assisted the CEMA member countries in determining the amount and developing the most rational plans for utilizing hydroelectric potentials.

By virtue of a number of specific features, hydraulic power engineering is of major importance in the development of electrical power engineering. The electricity produced at GES [hydroelectric plants] and GAES [pumped-storage electric power plants] is used basically to cover the demand for

flexible power capabilities, which will increase in the future in connection with the intensive construction of major thermal and nuclear power plants.

The natural conditions and possibilities for using hydraulic power resources differ among the CEMA member countries and the SFRYU. The hydraulic power potentials of the European part of the USSR, the Hungarian People's Republic (VNR), Polish People's Republic (PNR) and Czechoslovakian SSR (ChSSR) are concentrated on level rivers with substantial flow, while most of the potential in the Bulgarian People's Republic (NRB), the Soviet Republic of Romania (SRR) and the SFRYU are made up of rivers in mountainous regions.

These factors determine the choice of water development configuration, types and constructions for structures and methods of organizing and carrying out construction work, which is reflected in the coordination plans for scientific and technical research carried out by the countries in accordance with coordinated programs.

This coordination, which is based on proposals of the CEMA member countries and the SFRYU, promotes the concentration of efforts and resources in the area of scientific research work, more effective utilization of the experimental base and the exchange of leading experience in hydraulic power construction.

The first integrated coordination plans for the most important scientific and technical research in the area of hydraulic power engineering developed for 1963-1965 and 1966-1970 were aimed toward solving problems associated with the most effective utilization of hydraulic power installations, studying issues involved in covering peak loads with river power plants and improving the design, construction and operation of GES, and ensuring water supplies for major thermoelectric power plants (TES).

During this period the analytical methods employed in the various countries and the results of investigations of transient water movement in open water currents during daily regulation of GES power were integrated. An estimate was provided of the influence of its peak operating mode on navigation conditions and on the deformation of river beds in banks.

Joint developments of the countries for controlling GES and their integrated automation were of considerable interest. The findings from investigations of the dynamic properties of hydroelectric units, control systems and systems for regulating active power, as well as optimizing the operating mode of GES cascades, were integrated.

In solving the problem of technical water supply for major thermal and nuclear power plants, the results of hydraulic and thermal investigations of river water supply systems were analyzed and summarized, both for those which produce no affluent by virtue of recirculating spent hot water, and those involved with the development of the most rational constructions for deep water intakes. The results of joint work on this theme have been put to use, e.g., in the PNR at the "Pontnuv" thermoelectric plant and in the USSR at the Kirishskaya, the Reftinskaya, the Kostromskaya, the Krasnoyarskaya and other GRES.

A great deal of work has been done to provide a scientific foundation for individual design treatments of a number of basic constructions at hydraulic power facilities.

Hydraulic investigations have been made of various constructions for the inlet and outlet portions of hydraulic turbine units with vertical, horizontal and reversible turbines, which have served as the basis for developing recommendations on the selection of the optimal configuration and dimensions of the flow-through parts of GES and GAES. Materials from investigations associated with designing, constructing and operating high pressure spillway and water handling structures were analyzed and integrated, and have been used extensively in the NRB, the SRR, the USSR and other countries.

Of major interest for the participating countries was the integrated study of the stressed state of concrete dams considering climatic conditions and construction methods. These projects, which are of substantial scientific and practical importance, were continued in subsequent years.

In connection with the expanding construction of rock- and dirt-filled dams, integrated investigations were made in the area of infiltration. These studied the technical foundations of methods for analyzing and modeling infiltration phenomena. Constructive proposals were developed for the use of anti-infiltration components and protective coverings for hydrotechnical constructions.

The results of the joint work are wisely used in the NRB, VNR, PNR, USSR and ChSSR at hydraulic power and water management facilities.

The Section devoted particular attention to studying the possibilities of using bituminous asphalt, polymer and other new construction materials in hydrotechnical construction.

Coordination of activity in this area made it possible to reduce the amount of previously planned scientific research work and to become thoroughly acquainted with the achievements, reflecting leading world experience, of the participating countries. As a result, the use of bituminous latex compounds, cold asphalt mastics and polymer materials for waterproofing hydrotechnical constructions expanded significantly.

Special questions concerning the design, construction and operation of pumped-storage installations which are planned for construction over the next 5-10 years were resolved in a timely fashion.

During the first phase (1963-1970) of cooperation in the area of hydraulic power engineering and hydrotechnical construction, coordination of the most important scientific research promoted continued technical progress in designing, constructing and operating power and water management facilities in the CEMA member countries and the SFRYU.

The second phase (1971-1980) is characterized by a transition to fundamentally new forms of joint scientific research work and deeper analysis of the issues interesting the parties, including those involved with environmental protection and improvement.

During 1971-1975 joint investigations were made on two basic problems:

-- improving the operation of hydraulic energy installations;

-- substantiating design treatments and developing progressive constructions for hydrotechnical facilities.

Integrated investigations of technical water supply systems for major thermal and nuclear power plants were of great scientific and practical interest for the participating countries. As a result of these investigations, a number of complex problems were solved, including the following:

-- providing reliable thermal electric plant and nuclear power plant water supply under conditions of fluctuating hydrological, meteorological and other factors;

-- development of rational constructions for selective deep water intake from stratified bodies of water, as well as oceans;

-- effective configuration of high capacity block pumping station;

-- aspects of protecting water intakes against deposits and protecting fish life.

The results of the investigations have been used at the "Varna" and "Maritsa-Vostok" thermal electric plants and the "Kozloduy" nuclear power plant (NRB), at the Pechorskaya, the Stavropol'skaya and the Kurakhovskaya GRES and the Novovoronezhskaya nuclear power plant (USSR), as well as other sites. Their implementation has produced significant technical and economic results.

In order to select a progressive method for determining GES and GAES efficiency, specialists conducted joint full scale investigations at the "Peshchera" GES (NRB) and the "Zhidovo" GAES (PNR). These served as the basis for developing practical recommendations and providing quantitative and qualitative assessments of the accuracy provided by different efficiency measurement methods.

The Section also places a great deal of emphasis on studying problems of ensuring the reliability and safety of hydrotechnical structures, conducting full scale investigations of structures under construction and in operation using embedded instrumentation, and determining the possibilities of employing such equipment as produced in the CEMA member countries.

The requirements of the CEMA member countries for instrumentation is determined systematically, and information is gathered on instruments being produced. On this basis the USSR, the coordinating country (with lead organization "Gidroproyekt"), compiled a catalogue of instrumentation produced by cooperating socialist countries.

A great deal of attention is also now being devoted to automating observations and processing the results. Joint full scale investigations employing equipment produced by the CEMA member countries and capitalist countries were extremely useful: these were conducted in order to compare and determine the technical level of the instrumentation and were carried out at the "Markersbakh" GAES in the GDR. Similar investigations are now underway at the Dregan concrete dam under construction in the SRR.

A group of scientific research projects to update design treatments for concrete dams, incorporating the following two basic sections, has been completed:

-- investigation of engineering-geological and geotechnical characteristics of foundations;

-- theoretical and experimental methods of investigating the stress-deformed state of concrete dams.

Under the first section, existing methods for engineering geological prospecting and studying the physical and mechanical properties of rock

foundations have been integrated and analyzed. A method has been developed for schematizing and constructing engineering geological models of the rock massif.

Under the second section, theoretical and experimental investigations have been made of concrete dams with respect to seismic effects, the thermal stressed stage of massive concrete constructions and the use of the finite element method to design concrete dams.

As a result, new analytical methods have been implemented in the CEMA member countries. In the USSR, for example, these have been reflected in construction standards and rules, and have been employed in designing the Sayano-Shushenskaya, the Toktogul'skaya, the Kurpsayskaya and in the Ust'-Ilimskaya GES.

Integrated investigations involved in the development and technology of polymer material applications in hydrotechnical construction have been developed further.

The work on this theme included a joint study of the properties of epoxide materials employed in the CEMA member countries and the SFRU for waterproofing and anticavitation coatings, seals, polymer compounds for repairs and adhesives.

Investigations carried out by specialists from the participating countries using a unified methodology at the laboratory base of the All-Union Scientific-Research Institute of Hydraulic Engineering imeni E.Ye. Vedeneyev (VNIIG, USSR) made it possible to evaluate and compare various materials and to obtain valuable data for practical purposes. New forms of cooperation were also used in developing the theme entitled "Use of Computers to Solve Problems Involved in Hydraulic Structure Investigation, Design, Construction and Operation".

In working on this topic, the specialists regularly exchange information about their computer algorithms and programs. The coordinator -- specialists from the SRR -- used the resulting materials to compile a catalogue of programs employed in the CEMA member countries and the SFRYU in the area of hydraulic power engineering. This then served as the basis for bilateral (contractual) relations between the countries, e.g., the USSR and the NRB.

One helpful measure was the "EVM GES-73" [computers for hydroelectric plants] conducted in June 1973 in Leningrad at VNNIG. This symposium attracted the participation of more than 100 specialists from the CEMA member countries and the SFRYU.

The published proceedings of the symposium include 43 reports and 143 descriptions of algorithms and programs which fully reflect the status of developments in the participating countries in the area of computer use for hydraulic power engineering and hydrotechnical construction. The materials which the countries obtained on this subject are of practical value, and have been used widely in designing power facilities.

The following two themes were carried out:

-- "Hydraulic Investigations Associated with Developing Constructions for Spillway Structures and Gates" (Coordinating country -- NRB);

-- "Infiltration Investigations Associated with Substantiation of Progressive Treatments in the Area of Dams Made from Local Materials" (Coordinating country -- VNR).

These served as the basis for preparing, and to a significant extent implementing, recommendations on selecting rational constructions for surface and underwater intakes and energy absorbers with allowance for the phenomena of aeration and cavitation. These were taken into consideration in developing the construction of anti-infiltration devices which ensure reliable operation of dirt-filled dams in various climatic zones.

Joint work was done during 1976-1980 on a complex problem including aspects of creating and operating hydraulic and pumped-storage power plants considering their operation as part of the Consolidated Electrical Systems (OES) of the CEMA member countries.

The main task was to define measures to ensure continued improvement in methods of designing, investigating and constructing hydraulic power installations and systems so that they can operate more effectively within the consolidated electrical system.

That period also marked the successful development of the basic principles of utilizing hydraulic energy resources and the general prospects for development of GES and GAES as part of consolidated electrical systems, including issues of the flexibility of hydraulic power installations and improving schemes for utilizing rivers and optimizing the degree of automation and remote control of GES, GAES and GES cascades by computer.

The influence of dynamic and other types of effects on the stressed state and deformability of hydraulic structures was analyzed within the framework of the theme covering the foundation and improvement of design approaches in constructing hydraulic power facilities.

A significant number of joint thematic projects were aimed at introducing new construction materials and technologies into hydraulic power engineering and hydrotechnical construction in order to reduce the consumption of cement, metal and other scarce materials, as well as reducing the cost and amount of time involved in erecting structures.

The results of the second phase of coordinating the most important scientific and technical research (1971-1980) in the area of hydraulic power engineering and hydrotechnical construction provide evidence of its fruitfulness and major role in improving the effectiveness of hydraulic power engineering and water management construction in the CEMA member countries and the SFRYU.

The use of such forms of cooperation as employing teams of specialists in laboratory and full scale investigations and holding symposia and seminars on the most urgent problems promoted the development of firm business connections between the specialists of the CEMA member countries, improvement in the quality of research and timely introduction of progressive technical treatments.

A plan coordinating the most important scientific and technical research for the present five-year plan (1981-1985) has been compiled considering analysis and integration of the working experience of the Section on Hydroelectric Plants of the CEMA Standing Committee on Cooperation in the Area of Electrical Energy for the preceding period, as well as proposals of the delegations from the CEMA member countries and the SFRYU.

This plan encompasses a wide group of issues which are of mutual interest, and includes investigations associated with the rational utilization of hydraulic power resources within the framework of the integrated water management systems of the CEMA member countries, with creating earthquake-resistant GES and GAES with high concrete and earth-filled dams, with operating basic GES and GAES hydraulic power equipment, and with developing mechanized methods of constructing hydraulic power structures while implementing new technology and high capacity equipment.

The plan contains provisions for full scale observations of the condition of hydrotechnical structures employing sophisticated means and methods of measurements and investigations and using these as the basis for developing recommendations for improving the reliability and improving hydraulic structure constructions.

Successful resolution of problems in the area of hydraulic power engineering will make it possible to accomplish on schedule the measures provided for in the Long-Range Target Program for Cooperation in the Area of Electrical Energy, and will be a new stage in the development of socialist economic integration of the CEMA member countries.



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# YU. P. BATALIN CALLS FOR PIPELINE COMPLETION

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 4, Apr 83 pp 2-8

[Article by Yu. P. Batalin, USSR first deputy minister of construction of petroleum and gas industry enterprises: "Successfully Completing the Urengoy-Pomary-Uzhgorod Natural Gas Pipeline, Core Project of 1983 and the 11th Five-Year Plan"*]

[Text] Our country, the Union of Soviet Socialist Republics, has entered the third year of the 11th Five-Year Plan. One more important stage has been completed along the road of economic and social development of the Soviet State and practical implementation of the historic decisions of the 26th CPSU Congress.

Noting the particular importance of successful accomplishment of the 1983 economic and social development plan for the five-year plan as a whole, the November (1982) CPSU Central Committee Plenum drew the attention of party, soviet, economic and other organizations and workforces to the necessity of greater intensification of societal production and increasing the efficiency of the nation's economy, achieving maximum end results with minimum outlays, and all-out utilization of production reserve potential.

The decisions of the CPSU Central Committee Plenum and the speech by CPSU Central Committee General Secretary Comrade Yu. V. Andropov aroused enthusiastic approval on the part of the workers of this industry. They, just as the entire Soviet people, unanimously support party domestic and foreign policy, are mobilizing their efforts to correct deficiencies and utilize production reserve potential, and are filled with resolve to ensure ahead-of-schedule accomplishment of state plans specified for 1983.

The foundation for successful accomplishment by the workforces of this industry of the targets for the third year of the five-year plan were laid down in 1982.

First of all, installations which directly influence growth in oil and gas production and shipping were brought on-stream, which helped to a

* Speech at expanded session of the board of the Ministry of Construction of Petroleum and Gas Industry Enterprises and the Presidium of the Central Committee of the Trade Union of Oil and Gas Industry Workers (published in abbreviated form).

decisive degree achieve accomplishment of the annual plans of Mingazprom [Ministry of Gas Industry] and Minnefteprom [Ministry of Petroleum Industry].

Last year a total of 12,300 kilometers of trunk pipeline was brought into service, including 9,300 kilometers of natural gas pipeline, 1,700 kilometers of oil pipeline, 800 kilometers of product line, approximately 600 kilometers of other pipelines, 43 compressor and 25 pumping stations, more than 1 million cubic meters of oil storage capacity, other facilities and installations.

Last year more than 5,300 kilometers of 1,420 mm diameter natural gas pipeline came on-stream, which is equal to half of the volume of completion of such trunk pipelines during the entire 10th Five-Year Plan.

Natural gas processing plants with a total capacity of 26 billion cubic meters per year were built in the gas fields, oilfield oil and gas separation and treatment facilities with a total capacity of 52 million tons per year, oil gathering and custody transfer facilities with a capacity of 267,000 cubic meters per day, facilities for maintaining formation pressure with a capacity of 211,000 cubic meters per day, 608,000 cubic meters of stock tanks, and 5,300 kilometers of oilfield pipe lines.

One of the industry's most important pledges pertaining to implementing the decisions of the 26th CPSU Congress is being fulfilled -- that of bringing into service 2-3 months ahead of schedule the natural gas pipelines from Urengoy to this country's central and western regions, pipelines which are called the central construction projects of the 5-year plan. The Urengoy-Petrovsk natural gas pipeline was brought into service ahead of schedule. It, just as the Urengoy-Gryazovets natural gas pipeline, was brought up to design capacity in the same year it was brought into service. A total of 2,400 kilometers of the Urengoy-Novopskov natural gas pipeline were built 4-6-7 months ahead of scheduled target completion and brought into service stage by stage. Completion was delayed somewhat on the northern section, but that entire section as well was brought into service 3 months ahead of schedule.

The plans for 1982 and the first 2 years of the five-year plan pertaining to bringing into service refined products pipelines for USSR Goskomnefteprodukt [State Committee for Supply of Petroleum Products] were overfulfilled. Above-plan construction totaled 309 kilometers.

A total of 1.8 million square meters of housing was completed, schools accommodating 13,200 pupils, preschool children's facilities accommodating 10,400, plus many other cultural-services, trade and worker supply establishments.

Commodity construction product worth 4.7 billion rubles was turned over to clients, an increase of 850 million rubles or 21 percent over 1981. The highest growth rate in volume of construction and installation work was achieved in 1982 (15 percent with a targeted 10 percent). The absolute annual growth increment is practically equal to the figure achieved for the entire five-year plan (609 and 630 million rubles respectively).

The annual contracting work program was completed by the ministry ahead of schedule -- by 20 December. A high labor productivity growth rate was achieved. With a targeted 3.5 percent, growth amounted to 9 percent, and 15 percent for the first two years of the 11th Five-Year Plan, while labor productivity rose by 17.4 percent during the entire preceding 5-year plan.

The ministry's industrial enterprises accomplished the 1982 plan in all volume-measured indicators -- normative net and sold merchantable product.

The majority of the industry's workforces met their socialist pledges in honor of the 60th anniversary of establishment of the Union of Soviet Socialist Republics.

At the same time, however, there was failure to bring on-stream some of the plan-specified installations and facilities. The poorest job as regards gas industry facilities was done by Glavtruboprovodstroy, Glavsibtruboprovodstroy, and Soyuzgazpromstroy, and for oil industry facilities -- Glavtruboprovodstroy, Glavvostoktruboprovodstroy, and Glavyuzhtruboprovodstroy.

The 1983 Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] tasks are determined by the necessity of achieving accelerated development of this country's fuel and energy complex, achieving the most rapid possible increase in gas industry production capacity, and a substantial increase in the scale of work being performed for the oil industry.

For the ministry as a whole, including facilities carried over from last year, approximately 15,000 kilometers of trunk pipeline should be brought on-stream this year, including 9,900 kilometers of natural gas pipeline, 2,800 kilometers of oil pipeline, and 1,120 kilometers of products pipeline.

Tough targets must also be met in the area of social development. Plans call for building 2 million square meters of housing. Substantially more social and cultural-services facilities will be built than in 1982.

Following are the industry's most important tasks.

The volume of contracting work is increasing by 17 percent for Minnefteprom. The principal efforts of our organizations will continue to be concentrated on building oilfield lines and facilities in Western Siberia, where 790 million rubles worth of work is to be performed for Minnefteprom, which comprises 60 percent of the total work volume for this ministry. The volume of work in this region will increase by 20 percent over last year.

In 1982 Glavtyumenneftegazstroy and Glavtyumentruboprovodstroy accomplished their principal tasks pertaining to bringing facilities on-stream for the Tyumen oil workers. The foundations were laid for extensive development of the new gas-lift method of producing oil. In 1982 8.8 million tons of crude were produced by this method. In 1983 gas-lift production is targeted to increase to 40 million tons. Subsequently as well it will be a determining factor for meeting plan targets by Tyumen oilfield workers. Large tasks must be accomplished pertaining to building casinghead-gas recovery facilities, storage tank construction, etc. One can be assured that in 1983 as well the Tyumen construction people will successfully meet their specified targets.

In connection with the fact that in 1983 Tyumen is targeted to produce 1.5 million tons of crude oil above plan, oil must begin moving from the fields on the Middle Ob in a prompt manner. It is therefore essential to speed up construction of the Kholmogory-Perm oil pipeline. In 1983 500 kilometers of this line must be brought into service, including 320 kilometers by Glavtyumentruboprovodstroy, and 190 kilometers by Glavvostoktruboprovodstroy. The entire trunk pipeline, right up to Perm, is to enter service in the first quarter of 1984.

Work volume for the gas industry ministry totals 3 billion rubles -- 61 percent of the entire Minneftegazstroy program.

This yaer's main task is construction and completion of the Urengoy-Pomary-Uzhgorod natural gas pipeline together with 18 compressor stations, 10 of which are being built by organizations of our ministry.

It is therefore important to analyze the status of construction and measures ensuring unconditional fulfillment of pledges pertaining to ahead-of-schedule completion of this unique natural gas pipeline, which is a core construction project for 1983 and the 11th Five-Year Plan.

The Urengoy gas field should be viewed as an integral whole with the Urengoy-Uzhgorod natural gas pipeline and other natural gas pipelines from Urengoy.

Accelerated construction and ahead-of-schedule completion of trunk natural gas pipelines, coupled with delay in building Urengoy gas field lines and facilities, has created a situation where shipping capabilities have outstripped production capabilities.

Glavrengoygazstroy, Sibkomplektmontazh, and installation organizations failed to accomplish the 1982 targets pertaining to bringing on-stream UKPG [natural gas processing plants] and loop gathering systems. Of course contributing factors include late delivery of pipe and equipment, failure by the transport people to meet supply delivery schedules during the navigation season and by rail. But one cannot deny that there was plenty of opportunity to lay substantially greater volume of loop gathering systems, gathering lines, and to bring UKPG on-stream sooner. This was hindered by poor job organization, lack of engineering preparation, poor coordination among agencies participating in the construction project, and sometimes irresponsibility on the part of certain officials as well.

The matter of development of Urengoy today occupies the focus of attention. The organizations of Minneftegazstroy should immediately take exhaustive measures to bring UKPG-9 on-stream in May, UKPG-10 in August, UKPG-1 AS in the fourth quarter, as well as 200 kilometers of loop gathering systems and 200 kilometers of gathering lines by the dates agreed on with the client.

In 1983 it is essential to work on a broad front on facilities connected with the production, transport and processing of condensate, in order to bring into operation the first unit of this system in the first half of 1984, as specified by ratified plans. This direction of development of the fuel and energy complex, which is new for Western Siberia, is of exceptionally great economic effectiveness. An in spite of difficulties (delayed determination by clients of

matters pertaining to design, pipeline terminal branches and areas, etc), this industry's subdivisions should do everything possible in order fully to utilize this winter season, since a single winter is insufficient to accomplish the assigned task.

The year 1983 can rightly be called the year of the Urengoy-Pomary-Uzhgorod export natural gas pipeline. When it reaches design capacity, our country will become the world's leading natural gas producer. Accelerated construction of this natural gas pipeline is a most important economic and political task.

Construction of the export natural gas pipeline is an important measure in the campaign for peace and for development of long-term economic and other relations between our country and the countries of Western Europe. But this runs contrary to the global policy of U.S. imperialism. It is not by accident that the Reagan Administration undertook a number of economic and political steps aimed at thwarting construction of the Urengoy-Pomary-Uzhgorod natural gas pipeline. We know the result of these measures: they were a total failure. Nor could it have been otherwise. And of course an important role in this was played by the selfless labor of our industry's workers.

Never before has this industry been assigned such a complex and critical task as construction of such a unique natural gas pipeline on an exceptionally short timetable. The pipeline runs 4,451 kilometers, with 40 compressor stations powered at more than 3 million kilowatts, 2.7 million tons of pipe, 1.5 million tons of weights, 129 million cubic meters of earthmoving, more than 2,000 kilometers of welds, and 794 river crossings. The cost of the pipeline -- 7.6 billion rubles -- also says a great deal. Naturally such a task can be accomplished only through the efforts of our entire country. More than 30 ministries are involved in building the pipeline and in resolving technical and other matters. These include machine builders and transportation people, construction ministries and supply agencies; Komsomol and the trade unions are working actively, and local party and soviet agencies are lending great assistance to the project. Construction progress is regularly covered by all the media.

Measures have been specified to accelerate construction of trunk natural gas pipelines and the export pipeline, measures ensuring that tasks are in balance with logistic support, increase in the production capabilities of construction organizations, and reequipping of industrial branches.

The performance capacity of our organizations, both on the line and in surface construction, today greatly exceeds the figures of two years ago. Rehabilitation of the gas industry is being accomplished ahead of schedule. The actions taken by the Reagan Administration sped by 1 year the equipping of trunk natural gas pipelines with units of a new type . Twenty-five thousand kilowatt units manufactured by Leningrad machine builders have already commenced delivery. The Urengoy-Pomary-Uzhgorod natural gas pipeline will also be supplied 16,000 kilowatt units powered by aircraft engines, which will make it possible to reduce by 50 to 67 percent labor expenditures (on building compressor stations). Fifty-five of these units will be delivered to the installation site in 1983.

Resolution of problems connected with building the Urengoy-Pomary-Uzhgorod natural gas pipeline is continuously being monitored by the CPSU Central Committee and USSR Council of Ministers.

This strengthens the feeling of patriotism and strong responsibility for accomplishing the assigned tasks on the part of all participants in the construction project.

This industry's workforce had made tougher revised pledges pertaining to ahead-of-schedule completion of the export natural gas pipeline.

Construction of the pipeline began in July of last year. And from the very outset there was an aggressive work effort by socialist competition pacemakers -- the workforces of the Soyuzgazspetsstroy, Mosgazprovodstroy, Kuybyshevtruboprovodstroy, and Bryansktruboprovodstroy trusts, plus other units. This made it possible to complete the year's overall work schedule for the natural gas pipeline by 7 November 1982. In six months time Comrade Kushka's spread had completed 135 kilometers, Comrade Mikhel'son's spread -- 126, Comrade Belyayeva's -- 119, and Comrade Buyankin's spread -- 98 kilometers. The work is being performed with excellent quality while maintaining a fairly high pace of construction.

Unfortunately Glavtruboprovodstroy and its trusts, working on their 780 kilometer stretch extending to Yelets, on the whole failed to complete laying the line and to commence pressure-testing it in December 1982, as specified by pledges. Of course the weather was an important factor, but the main reason is the fact that, as a result of initial successes, the organizations, main administration and trust officials, and those in charge of the spreads displayed complacency and failure adequate to appreciate the complexities involved in the completion stage.

Weather conditions indeed made the job more difficult for the Siberian organizations and Glavvostoktruboprovodstroy along swampy stretches. Therefore alongside a substantial overfulfillment of ratified schedules, some organizations failed to meet their pledges.

Completion-scheduled sections, tied in with previously-built systems and generating genuine economic effect from stage-by-stage bringing into service, were examined and agreed upon together with Mingazprom. The first stage -- completion of the section running from Algasovo to Yelets in March 1983 -- enables Mingazprom to resolve the matter of natural gas transmission in this area and to provide additional pumping into underground reservoirs during summer. The second stage is completion of the section from the Pomary compressor station to Algasovo. It is scheduled for completion and testing in March. It will not produce great economic effect, but speeding up the testing is required for efficient moving of testing equipment and release of manpower and resources before the period of spring thaw and muddy roads. The most difficult and longest section, running from Urengoy to the Lyalinskaya compressor station, is scheduled to enter service in May. Its completion will immediately produce an appreciable increase in the shipping of natural gas. June completion of construction of the section running from the Lyalinskaya compressor station to the Pomarskaya compressor station, completion in August of the

stretch running from Yelets to Barskaya, and in the third quarter the stretch from Barskaya to Uzhgorod will make it possible to close the pipeline along its entire length.

Thus the natural gas pipeline is to be brought into service sequentially, by section. Stage-by-stage completion is a most important organizational measure, making it possible to complete startup procedures in a prompt and timely manner and to ensure ahead-of-schedule completion of the entire trunk pipeline.

In order to obtain maximum effect from stage-by-stage completion of the various sections, it is planned to bring on-line ahead of schedule the Verkhne-Kazymskaya and Pomarskaya compressor stations -- in June, the Pravokhettinskaya in September, and the Komsomolskaya and Kungurskaya in October. The stage-by-stage completion of individual sections of the pipeline together with compressor stations will enable the Ministry of Gas Industry to produce a substantial quantity of natural gas above traget and to place additional reserves in underground reservoirs by the beginning of the winter period.

The pledges being made by Minneftegazstroy workforces to complete the Urengoy-Pomary-Uzhgorod natural gas pipeline ahead of schedule also make it necessary to reexamine the problem of testing completed sections. The head-end section, from Urengoy to the Tayezhnaya compressor station, will be tested with gas. The remainder of the trunk pipeline, extending a total of 3,800 kilometers, must be tested with water. This job is no easy one either in scale or time of year when the testing is to be performed. Naturally hydraulic testing in winter is a risky business, but our organizations have experience in winter hydraulic testing. The success of this measure is an entirely realistic assumption with good engineer preparation and precise organization of the job.

Calculations and analyses indicated the possibility of completion in March (figuring in time for performing testing) of work on the line proper on the section running from Urengoy to Yelets, assuming Glavsibtruboprovodstroy and GLavvostoktruboprovodstroy reach a 12 kilometer average daily rate with coating and wrapping.

It is interesting to make an estimate proceeding from statistical data on construction of large trunk pipelines in past years. For example, average output per spread exceeded 20 kilometers for a project as a whole on construction of the Samotlor-Almetyevsk oil pipeline and the Urengoy-Chelyabinsk natural gas pipeline in March, and on the Surgut-Polotsk oil pipeline in April. If they perform even as they have in the past, considering the number of spreads operating on the project, it is realistic to target completion in March of all line work proper on the export natural gas pipeline. Of course a more thorough analysis is needed, taking into account the complexities and specific features of concrete sections. But nevertheless such a general estimate is valid.

Glavvostoktruboprovodstroy is operating 14 principal spreads, with four additional ones added. With this manpower and these resources, the remaining work can and must be completed in 40-50 days. The same can be said about Glavtruboprovodstroy.

The northern, head-end section is determining, both from the standpoint of volume of work remaining, complexity of execution, and effect produced.

Glavsibtruboprovodstroy achieved an average per-spread output performance in March of 26 kilometers on natural gas pipeline construction. This main administration presently has 12 spreads, and the production capability of these spreads is considerably greater than in the past. The main administration is planning to form an additional two or three spreads. All this has generated confidence over the possibility of completing line work in two months. The main administration and the trusts bring all spreads up to strength and mobilize them on the natural gas pipeline as quickly as possible, and ensure their uninterrupted work progress.

As the experience of other main administrations indicates, the Tyumen people can achieve considerable results from the adoption of measures to improve the economic management mechanism and material incentive in pipeline construction. In order to implement current forecasts of construction progress on the most important trunk pipelines, VNIIST [All-Union Scientific Research Institute for Construction of Trunk Pipelines] and GIVTs [expansion unknown], jointly with the UkSSR Academy of Sciences Institute of Cybernetics, devised a methodology and computer programs making it possible, taking into account conditions of natural environment and climate, time of construction, description of the right-of-way, analysis of construction progress on similar projects, and dynamic evaluations of rates of advance achieved by spreads on the pipeline under consideration, to predict a work completion time for each section and to evaluate the toughness of the targets assigned to the spreads. At the ministry such calculations are performed approximately once a week. They make it possible to determine the spreads which are in or on the edge of the critical zone and to take appropriate measures. In particular, according to the evaluation of 27 January, 10 spreads are in the critical zone and 14 are close to it. It is essential to intensify their work efforts.

The following can be specified as priority measures to intensify the work efforts of the pipeline spreads.

First of all it is necessary to intensify the work being performed by each workforce, by establishing an equipment reserve, by improving equipment servicing and repair, worker living conditions, skillful application of moral and material incentives, and strengthening of day-to-day supervision and management.

It is advisable to change the boundaries of the sections assigned to those spreads which are failing to handle the assigned work volume and to assign to these sections adjacent spreads which are more successfully accomplishing their tasks. Such a change is advantageous for those spreads whose line length is extended and, on the contrary, worsens economic indices and the financial situation of the workers, engineers and technicians of those spreads whose sections are reduced. It will be essential to implement this measure everywhere. Therefore lagging spreads must consider the question of whether they should permit the length of their assigned section to be shortened.

An important measure to beef up the work performance of the spreads is shifting of personnel. It is difficult to redeploy entire spreads along the right-of-way, since good and poorly performing spreads are frequently a considerable distance from one another, and it is difficult to accomplish such a move efficiently. A large-scale experiment is presently being performed: shifting spreads and personnel in conditions of the new economic management mechanism (the spreads of comrades Pen'yevksiy, Mikhel'son, and Belyayeva). This experiment must be broadened. It is expedient to adopt the tactics of Glavvostoktruboprovodstroy of putting on "critical" points along the pipeline additional spreads which, having unplugged bottlenecks, return to other pipelines in 1-1.5 months.

Considerable time losses occur at the final stage of construction. On the Urengoy-Petrovsk pipeline, for example, Glavsibtruboprovodstroy completed coating, wrapping and lowering in in December 1981, but did not bring its section into service until 3 months later. On construction of the Urengoy-Novopskov natural gas pipeline, on most of the sections the main administration completed coating and wrapping in the spring of 1982, on the entire pipeline at the beginning of December, while this pipeline was not brought into service until the end of January. A similar picture is observed in other main administrations.

The analytical data presented below make it possible to do a good job of evaluating what is occurring.

On the Urengoy-Petrovsk natural gas pipeline right-of-way, Glavsibtruboprovodstroy expended 5.1 days on the average on the principal jobs involved in building 1 kilometer of pipeline, and 4.2 days on the final stage. Figures for the Urengoy-Novopskov natural gas pipeline are 4.6 and 6.4 respectively. Of course the figure for the Pskov pipeline was affected by failure to accomplish targets in the spring on 1982 because of an early thaw, but nevertheless the main administration could have tested and brought into service a number of sections during the summer, rather than dragging their completion out by more than half a year.

In Glavvostoktruboprovodstroy, during construction of the Urengoy-Petrovsk natural gas pipeline an average of 3.4 days were expended per kilometer on the principal job operations, and 2.9 days in the final stage; the figures are 2.2 and 1.5 days respectively on the Pskov natural gas pipeline. Thus the duration of the final stage is appreciably decreasing, but nevertheless remains intolerably large.

In Glavtruboprovodstroy the figures were 2.1 and 1.8 days respectively on the Urengoy-Petrovsk line, and 1.6 and 1.1 days respectively on the Urengoy-Novopskov line.

The figures average 3.2 and 3.0 on the Urengoy-Petrovsk natural gas pipeline, and 2.4 and 3.0 days on the Urengoy-Novopskov pipeline, that is, there has been no improvement on the latter line, reflecting the unsatisfactory performance of Glavsibtruboprovodstroy.

How is it possible to avoid such time losses in the final stage of construction?

First of all it is essential to increase production and process discipline.

We must eliminate so-called technological gaps. A substantial portion of the final stage is spent on eliminating them. Here too a decisive role should be played by engineer-technological mobile mechanized columns (PMK) and early construction of crossings and difficult route segments.

Much time is spent on correcting defects involving failing to run pipelines to the prescribed elevation point. For example, the Privolzhskgazpromstroy Association and the Spetsstroymontazh Trust completed a 105 kilometer section of the Petrovsk-Yelets natural gas pipeline in 1981, and were compelled to work throughout the entire year 1982 on "adjusting" crossings of ravines, river floodplains, and farmland. The Ryazantruboprovodstroy and Mosgazprovodstroy trusts as well as the Soyuzgazpromstroy Association spent several months each on "adjustment" during construction of the Torzhok-Minsk-Ivatsevichi natural gas pipeline. Glavsibtruboprovodstroy and Glavvostoktruboprovodstroy spent a great deal of time on "adjustments" on the Urengoy-Petrovsk and Urengoy-Novopskov pipelines.

It is essential to make process discipline more rigid and to beef up the geodetic service. A correct decision was made by the organizations of Glavsibtruboprovodstroy and Glavvostoktruboprovodstroy to increase pipe depth. This will make it possible to avoid "elevation adjustments," to obtain better pipeline restrainment, and correspondingly to increase its operating reliability.

The quality of welding, coating and wrapping operations also is reflected in the length of the final stage. Of course defects should not be permitted, but if one does occur, it is essential to correct it immediately. Many organizations postpone this work, however, which causes enormous additional expenditures of time and resources and, most important, engenders a lack of responsibility on construction projects. This in the final analysis does the greatest detriment.

Many delays occur through failure to coordinate operations with SUPNR [expansion unknown]. These services are small, and therefore at a rapid work pace many complications arise. On the basis of an agreement with Mingazprom officials, there will now be SUPNR services in every spread, and plans call for establishing services in each trust made up of representatives of the design institute and clients.

Installation of valves must be scheduled earlier. The branch gas industry administration, GlavPRU [expansion unknown], working jointly with the Mingazprom services, should refine the schedule for installation of block valves, bypass lines, scraper traps, and drip traps, working out with the main production administrations and trusts schedules for their installation, and preparing appropriate measures by the two ministries. One of the main organizational measures is the establishment and mobilization of engineer-technical units for early installation of block valves and bypass lines.

A no less important measure is providing a project with a sufficient quantity of filler and pressure testing equipment. This equipment must be concentrated in the engineer-technical administrations, which should be assigned testing operations. This will make it possible to establish skilled testing workforces, to improve equipment utilization, and to ensure the needed flexibility in assignment of filler and pressure testing equipment.

All problems connected with ballasting pipelines should also be resolved. It is essential that the number of mounted weights be strictly in conformity with the figure specified by the design. It is necessary to increase production of weights made of local materials. We cannot simply accept the fact that Glavsibtruboprovodstroy and the Severtruboprovodstroy and Priob'truboprovodstroy trusts have not yet set up production of weights from sand at summer concrete yards.

Corresponding targets pertaining to manufacturing weights and delivering them to the right-of way have been assigned to the construction ministries, the Ministry of Railways, Mintransstroy [Ministry of Transport Construction], and RSFSR Minavtotrans [Ministry of Motor Transport]. Prompt and timely delivery of weights to the right-of-way before onset of the spring thaw and period of muddy roads is a decisive condition for meeting pledges pertaining to ahead-of-schedule completion of the northern section of the pipeline.

Measures to improve the economic management mechanism being carried out in this industry, pursuant to the CPSU Central Committee and USSR Council of Ministers decree, have made it possible substantially to increase the efficiency of pipeline construction. Average annual output per spread increased to 71 kilometers in 1981, and to 101 kilometers in 1982. In the period 1976-1980 output per spread remained virtually unchanged, at 45-48 km per year.

In its decree on technical rehabilitation of our branch, the CPSU Central Committee assigned the task of increasing output per spread by a factor of 1.5 by the end of the 5-year plan. In actual fact it has doubled in two years. This is a fine work performance. It was achieved through measures to rehabilitate the branch as well as improvement of the economic mechanism and the system of organization and management.

Far from all reserve potential and capabilities have been utilized, however. We can achieve even greater results in 1983. Today many spreads are specifying new performance levels. In Glavvostoktruboprovodstroy and Glavtruboprovodstroy, socialist competition is in progress for achieving a stable annual rate of 200 kilometers per spread. Many workforces are already advancing on this schedule: for example, Comrade Mikhel'son's spread and both spreads from the Soyuzgazspetsstroy Trust. A number of other spreads have also drawn close to this performance level. There is a very real possibility of achieving and exceeding it. It is a legitimate goal for Glavsibtruboprovodstroy to assign the target and work to achieve an average per-spread output of 100 km and more.

The principal measure to achieve such performance figures is further improvement of the economic management mechanism. Matters pertaining to improving the economic management mechanism are regularly addressed in this branch; they were discussed in detail at the ministry board, the coordination council, and at a conference with spreadmen. The ministry has reached an agreement with USSR Goskomtrud [State Committee for Labor and Social Problems] on a decision calling for extension of the principles of the brigade contract, the Shchekino method, and other progressive forms of material incentive to achieve a higher level -- extended to all spreads working on the Urengoy-Pomary-Uzhgorod natural gas pipeline.

We should stress, however, that measures to improve the economic management mechanism will produce maximum effect only with a combined approach. Their implementation in the spread alone will not produce the needed result and will not enable us fully to reveal the capabilities of the spreads. It is essential to improve the entire organizational structure of pipeline construction, as is specified by the long-range branch development plan formulated by the coordination council and ratified by the ministry board.

It is necessary to complete as soon as possible the establishment of engineer-technical PMK [Mobile Mechanized Columns], PMK for road construction and transport operations, and cost-accountability sections for quality control. It is also important to speed up organization in the pipeline construction trusts of mechanization administrations focused on performing equipment servicing, maintenance and repair activities. Planning and evaluation of their activities should be performed on the basis of volume of construction and installation work, by means of division of individual estimates. The normative conditional-net production indicator must be adopted as a base.

This is particularly important because fixed assets have doubled in this branch. To achieve efficient utilization of these assets it is essential to do a good job of organizing service, maintenance, and repair service support. The work performance of the Soyuzremonttruboprovodtekhnika Association is producing a positive result in the area of imported equipment maintenance support, but all other equipment can be covered only through the mechanization administrations.

NIPIorgneftegazstroy [Scientific Research and Design Institute for Organization of Oil and Gas Industry Construction], other institutes, economists and officials from the central edifice of the ministry and the main administrations have devised a system of economic and organizational interrelations between subdivisions of a new type, specializing by production process stages. This system must be adopted as rapidly as possible.

Measures to improve the economic management mechanism are the most effective means of achieving successful construction of the export pipeline and other trunk pipelines.

Problems pertaining to speeding up construction of the Urengoy-Pomary-Uzhgorod natural gas pipeline cannot be resolved separately from targets pertaining to building following systems. It is essential to ensure the planned and orderly movement of spreads from one pipeline to another. The Minneftegazstroy board and the trade union central committee approve of the initiative of Glavvostoktruboprovodstroy and Glavtruboprovodstroy, which pledged to complete this year the section running from Tayezhnaya to Yelets on the Urengoy-Center I natural gas pipeline. But in order to complete by this deadline the northern section, which is the determining section, Glavsibtruboprovodstroy must shift from seasonal to year-round work on the line. And such a possibility exists. There are sections totaling approximately 300 kilometers on the new line on which work in the summer period can be organized. Pipe sections and weights should be hauled in to a number of sections during this winter period.

Underwater river crossings are critical points on trunk pipelines. Construction of riverbed crossings has improved considerably with establishment of the Soyuzpodvodtruboprovodstroy Association. The volume of work performed has increased by practically a factor of 1.5 during one year of operation by this association.

Socialist pledges and measures on the Urengoy-Pomary-Uzhgorod natural gas pipeline formulated by the association call for completing single-pipeline crossings from Urengoy to Yelets in the first quarter, from Yelets to Uzhgorod prior to the spring thaw and period of muddy roads, and second lines in the second and third quarters, with completion of the final crossing of the Dnieper in August. To date 18 of 32 crossings have been made, including 15 on navigable rivers.

The quality of construction and installation work, which determines the reliability of trunk pipelines brought into service, should be raised to a new and higher level.

In 1981-1982 the number of breakdown situations on operating pipelines declined 20 percent below the figure for the 10th Five-Year Plan. The significance of each, however, has increased sharply today, which is influenced by the factor of multiline systems.

A rapid pace of pipeline construction should not affect the quality of the work performed. This is precisely the way it is in the best spreads. The percentage of defects is not declining, however, in certain main administrations and trusts.

Analysis indicates that more than 50 percent of equipment failures during testing and operation involve special weld situations -- welding block valves and bypass lines into the line, and weld repairs -- and yet they comprise less than 5 percent of total welds. Insufficiently skilled welders are frequently allowed to perform these jobs, and welder process discipline is still poor. Scientists and experts must properly address the problem of bypass-line joints.

In order to improve the quality of welding operations and, correspondingly, pipeline reliability, in December 1982 USSR Gosstroy adopted additions to the Construction Standards and Regulations. They prescribe 100 percent inspection of welded joints on trunk pipelines by physical methods, and all joints of 1020-1420 mm diameter pipelines in Western Siberia, as well as on class 2 and 3 swampy terrain stretches and river crossings, must be inspected by X-ray or gamma-radiography techniques. This requires in 1983 an increase by a factor of 1.5 in inspection capabilities, double the production of flaw detectors and mobile laboratories, and pipeline projects must be provided with the necessary instruments and materials. And of course it is necessary to speed up the adoption of new equipment: pressure contact welding machines, powder wire electrode automatic welders, expanded utilization of BTS-143 pipe welding units, etc.

In addition, it is high time to adopt in this branch two-stage, two-level inspecting by Quality Inspectorate personnel, providing them with laboratory facilities for selective instrument inspection, as well as organization and arrangement of the operations of cost-accountable quality sections.

Matters of quality depend on many component elements, but primarily on labor, production, process, and design discipline.

Prompt, on-schedule construction of compressor stations plays a particularly important role in accomplishing the task of bringing the export natural gas pipeline into service ahead of schedule.

Last year more compressor stations were brought on line than in any preceding year -- 43, including 20 stations on the Urengoy-Petrovsk natural gas pipeline.

A number of organizations have achieved positive results in bringing compressor stations on-stream in a prompt and timely manner. Glavneftegazstroy fully accomplished its plan target. All six targeted stations were completed, and two of these were completed ahead of schedule. We should note the fine job being done by main administration top officials comrades Kudashev and Khutiyev. The top officials of the trusts (comrades Selivanov, Serov, Bakhtigareyev, Ustenko, and others) have addressed the task of building compressor stations with a serious attitude, continuously monitoring construction progress, accomplishing fast-response resolution of problems arising, and endeavoring to adopt advanced technical solutions and work methods.

Glavneftegazstroy is one of the most heavily work-loaded main administrations; it has the most diversified work project structure, from installation of oil and gas field facilities to large refineries, and it has less capability to shift around resources. At the same time it has done a better job than all other organizations with bringing major facilities on-stream, commenced construction of compressor stations with the requisite degree of responsibility, and ensured their completion. This has been achieved due to the ability to concentrate resources in a prompt and timely manner, to specify first-priority tasks, to focus workers, engineers and technicians on task performance in a prompt and timely manner, to establish firm contacts with client organizations, and to establish the requisite work completion leads.

Fine work has been done by the Kazymgazpromstroy Trust of Glavsibtruboprovodstroy. This is the most experienced workforce in the industry in building compressor stations. Within a short period of time they have built more than 50 stations and introduced many technical innovations. Even this trust, however, has its organizational deficiencies. For example, due to delay in site engineer preparation, delay in laying service lines, hauling in supplies and providing year-round vehicle access, as well as a lack of preparedness to operate during the spring-thaw period of muddy roads, the trust failed to bring the Uzyum-Yuganskaya compressor station on-line on schedule.

The trust's workforce has drawn the appropriate conclusions and is rectifying the situation. It achieved first completion of a compressor station, the Novokazymskaya, on the Urengoy-Novopskov natural gas pipeline. It was actually built in nine months.

The greatest failure to complete -- 12 compressor stations -- involved the Soyuzgazpromstroy Association. At the same time this association's Trust No 2, headed by Comrade Donets, successfully met its boosted target and completed all stations. The trust has appreciably improved production smoothness and work

quality. The majority of stations are being turned over to the client without need for corrective work. The association must extensively utilize this experience and know-how in order to catch up with its performance schedule.

Unforgivable errors, for the most part of an elementary organizational nature, were committed by the officials of Glavvostoktruboprovodstroy in building compressor stations.

The main administration was unable properly to receive a large number of workers assigned to its construction job on the basis of Komsomol job assignments. Officials of the Uralneftegazstroy Trust showed a particularly irresponsible attitude toward receiving additional young workers and organizing their work activities.

Main administration officials also proved inadequate to demands in an engineering understanding of the role of mobile trusts and the importance of the complete-module construction method. The Vostokkomplektmontazh Trust is not being adequately developed and is being diverted to line work instead of performing all work required on the surface components of the compressor and pumping stations as well as other facilities. The complete-modular method makes it possible substantially to reduce labor expenditures, and particularly at the construction site, by shifting construction and installation work and the processes of package integration, coordination and management to plants and package-assembly enterprises. For this reason an answer to the question of how the main administration should rectify the situation with compressor stations is to be found precisely in further improving the complete-module method. On the basis of scale of work performed, complexity of tasks connected with bringing new-generation stations on-line, and construction at new sites, many of which are in remote areas which are difficult of access, 1983 can be called the year of compressor stations. It is the culmination year of the five-year plan for compressor station construction.

In the unified power and energy corridor alone it is necessary to install 33 compressor stations (20 were built here in 1982), 10 of these on the Urengoy-Uzhgorod natural gas pipeline. An additional 13 compressor stations along this pipeline are to come on-line in the first quarter of 1984, for which work at the station sites should be virtually completed this year. The total value of the work performed on these stations in 1983 will amount to 250 million rubles. More than twice as much capital expenditure than in 1982 must be achieved on the construction of compressor stations (current and future completion-scheduled) in 1983 in the unified power and energy corridor as a whole.

Especially complex tasks face the Tyumen organizations. They must do 300 million rubles worth of construction on compressor stations this year, as compared with 150 million rubles in 1982. In its scale and complexity construction of stations along the Urengoy-Pomary-Uzhgorod natural gas pipeline within Tyumen Oblast greatly exceeds similar tasks on which the Tyumen construction people were working in the past.

This year's increased demands and ahead-of-schedule completion of the natural gas pipelines require running substantially ahead of schedule and bringing the first-priority stations on-line.

It is essential in 1983 substantially to shorten compressor station construction schedules. On the Urengoy-Gryazovets natural gas pipeline stations averaged 19 months in construction, with a 21 month standard figure, while construction averaged 17 months on the Urengoy-Petrovsk pipeline. On the Urengoy-Novopskov pipeline our subdivisions must not spend more than 14 months per station. Precisely this task -- reduction of compressor station construction schedules to 67 percent of the previous figure -- was assigned to the branch by the CPSU Central Committee decree on work by Minneftegazstroy in the area of technical rehabilitation.

Essential for completion of compressor stations on such a tight timetable are close interaction and businesslike cooperation with the client organizations and, first and foremost, in the area of speeding up delivery of equipment. Practical experience in building compressor stations on the Urengoy-Petrovsk natural gas pipeline indicated that delivery of equipment, which according to standard performance schedules was to be completed in October 1981, continued to July with the principal equipment, and to October 1982 on the remaining equipment.

Further shortening of compressor station construction schedules is impossible in the near future without streamlining relations between contractors and clients. The shift to commodity construction output has unfortunately not been bolstered with measures to increase the financial liability of clients in regard to fulfillment of commodity construction output plans. The existing contract system also involves a one-sided liability.

What sense would there be, for example, in a contract to build compressor stations on the Urengoy-Novopskov natural gas pipeline if the contract is signed 2-3 months after completion of the standard equipment provision timetable? Completion deadlines will continue to be plan-specified, while the responsibility is one-sided.

It is essential that the mutual obligations of the two parties be determined in advance, immediately following an appropriate determination on schedule for completion, and that they be governed by a long-term contract based on the standards specified in Construction Standards and Regulations and agreed-upon completion schedules containing full equipment lists and reflecting the specific conditions of construction, bolstered by requisite measures.

The unusual complexity of the job of building compressor stations demands extraordinarily firm measures. Officials of construction and installation organizations should mobilize all resources for hauling supplies to difficult-access sites.

The ministry central edifice and industrial enterprises were instructed to marshal the bulk of resources in the first quarter in order to accomplish tasks connected with delivering equipment to the compressor stations, and particularly along the northern section.

Maximum attention should be concentrated on setting up within a month's time communities designed for at least 1000 persons, each with an entire aggregate of

facilities ensuring normal living conditions. It is essential immediately to commence construction of Finnish complexes, SERB [expansion unknown] and dining halls specified by the station plan, in order to utilize them in the first period for receiving and servicing arriving construction and installation workers.

Construction of compressor stations on the Urengoy-Uzhgorod natural gas pipeline should be performed independently of work on other facilities, including compressor stations on the Urengoy-Novopskov pipeline.

Some officials believe that they will still have time to build compressor stations on the Urengoy-Uzhgorod pipeline after completing work on the Urengoy-Novopskov pipeline stations. This attitude is unacceptable. These are two totally separate and independent tasks. Our organizations should organize their work proceeding from this.

It is essential to pay greater attention to ensuring safe working conditions on construction of the big pipelines.

The party and government attach exceptional importance to protecting the health and lives of people on the job. The matter of production and labor discipline has been addressed with a particular sense of urgency, as the state of production and labor discipline determine worker safety in large measure. Creation of conditions eliminating the possibility of injury on the job and occupational disease, which raise the level of production sophistication and employee working conditions, is given equal status with other social tasks.

The ministry has drawn up a program of further improvement of industrial health and safety in this industry and has specified the principal directions to follow in accomplishing these tasks. Particular attention is focused on creating safe working conditions during construction of multiple, parallel trunk pipelines in the unified corridor and on strengthening production and labor discipline on the part of personnel at all levels, for lack of discipline is the main source of the majority of violations of safe and healthy working conditions.

Particular concern is evoked by violations of work safety rules in the safety zones of operating pipelines and power transmission lines.

Exhaustive measures should be taken at every enterprise and on every construction job to correct deficiencies in industrial health and safety and to intensify preventive efforts and elimination of the causes of equipment failure and accidents. Every person in a supervisory position, regardless of what it may be, must always bear in mind his personal responsibility to the party and state for establishing safe working conditions.

This industry has been given a difficult, responsible, but also honorable assignment to build the Urengoy-Pomary-Uzhgorod natural gas pipeline. The workforces of Minneftegazstroy are well aware of this. And the task lies not simply in building the export natural gas pipeline or even in completing it ahead of schedule. This pipeline should become a construction project incorporating sophisticated techniques, of flawless quality and reliability. New

landmarks of achievement in equipment, technology, and organization of pipeline construction should be grounded and assimilated in the course of this great project.

The workers of this industry assure the Communist Party Central Committee and Soviet Government of their resolve successfully to accomplish construction of the Urengoy-Pomary-Uzhgorod natural gas pipeline and to complete this honorable and responsible task ahead of schedule.



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# COMPLETION OF PIPELINE AHEAD OF SCHEDULE URGED

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 4, Apr 83 pp 8-11

[Article, published under the heading "On the Minneftegazstroy Board," by L. P. Kryukova: "Ensuring Ahead-of-Schedule Completion of the Export Natural Gas Pipeline"]

[Text] The Urengoy-Pomary-Uzhgorod natural gas pipeline has become the central construction project of the 11th Five-Year Plan and particularly of 1983. The main resources of Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] are concentrated on this project, which is of particular national importance.

In 1982 approximately 2,300 kilometers of welding was accomplished virtually in 6 months along the Urengoy-Pomary-Uzhgorod pipeline right-of-way; 1,850 kilometers of pipeline were coated, wrapped and lowered in, that is, considerably more than specified by the schedule. Many combined spreads overfulfilled their pledges.

The general political and labor enthusiasm evoked in this industry by construction of the export natural gas pipeline predetermined the higher performance results and work efficiency by the ministry's workforces in 1982 and through the first two years of the five-year plan.

At the same time, in the course of building the Urengoy-Pomary-Uzhgorod pipeline, progress has lagged in a number of sections in which subdivisions of Glavvostoktruboprovodstroy and the Soyuzintergazstroy Association are working. Glavsibtruboprovodstroy failed promptly to redeploy to the export natural gas pipeline right-of-way the requisite number of spreads and failed to have them work on a two-shift basis. Glavtruboprovodstroy failed to provide full manpower and equipment on schedule to the spreads on the northern section and was slow about eliminating spread fallbehinds and in testing completed sections. Construction on the western section was progressing at an unsatisfactory rate. The subdivisions of Glavukrneftegazstroy were working on the pipeline below existing capabilities. Work was progressing slowly at the sites of a number of compressor stations.

Steps to boost the pace of construction on the Urengoy-Pomary-Uzhgorod pipeline, to ensure its completion ahead of schedule, as well as the socialist pledges of

the workforces of the organizations and enterprises of Minneftegazstroy for 1983 were discussed at an expanded session of the ministry board and the Central Committee of the Trade Union of Oil and Gas Industry Workers.

V. E. Dymshits, deputy chairman of the USSR Council of Ministers, took part in the board proceedings. The meeting was attended by high-level officials of the CPSU Central Committee, USSR Council of Ministers, USSR Gosplan, the USSR People's Control Committee, the RSFSR Council of Ministers, the Ministry of Petroleum Industry, Ministry of Gas Industry, top officials of main administrations, associations, trusts, party committee secretaries, trade union committee chairmen, and officials from the offices of Minneftegazstroy and the Central Committee of the Trade Union of Oil and Gas Industry Workers.

The meeting was opened by USSR Minister of Construction of Petroleum and Gas Industry Enterprises B. Ye. Shcherbina.

A report on boosting the pace of construction and ensuring ahead-of-schedule completion of the Urengoy-Pomary-Uzhgorod natural gas pipeline was presented by USSR First Deputy Minister of Construction of Petroleum and Gas Industry Enterprises Yu. P. Batalin. He reviewed the principal performance results of the industry's workforces in 1982 and their targets for 1983 and analyzed the state of affairs at the Urengoy gas field, status of construction on the Urengoy-Pomary-Uzhgorod pipeline, and the sequence of completion of its facilities. Yu. P. Batalin pointed out ways to achieve further intensification of the work of the combined spreads, disclosed reserve potential for labor productivity growth in building both the pipeline proper and its compressor stations, and stressed the great economic effectiveness of stage-by-stage movement on-stream of the export trunk pipeline. The speaker fully discussed organizational, technical and technological measures ensuring unconditional fulfillment by industry workforces of socialist pledges to achieve ahead-of-schedule completion of the export pipeline.

The most effective means to achieve successful construction of the Urengoy-Pomary-Uzhgorod pipeline, stated Yu. P. Batalin, is implementation of measures to improve the economic management mechanism. Persons speaking at the meeting devoted considerable attention to this matter.

I. I. Mazur, chief of Glavtruboprovodstroy, noted that in 1982 the main administration, although performing somewhat below its capabilities, had accomplished a great deal to improve the organizational structure and establish combined spreads operating on a uniform work order. The main administration put 12 spreads to work on the Urengoy-Pomary-Uzhgorod pipeline right-of-way, and some of the spreads are completing redeployment. In order to boost the pace of construction it is essential to devote more attention to engineering subdivisions and to improve their equipment and supply. The main administration as a whole is assigned the target of laying 8 km of export trunk pipeline per day: 3 km on the northern section, and 5 km on the Ukrainian section. Work on the main section is to be completed in the first 10 days of April.

F. V. Mukhamedov, chief of Glavvostoktruboprovodstroy, discussing 1982 performance results, when the main administration's workforce resolved problems

of combined construction with good quality, stressed that increased work efficiency was promoted by implementation of measures to improve the economic management mechanism. Combined cost-accountable spreads were established, as well as engineer-technical mobile mechanized columns (PMK), and a mechanization administration. Preparation of the right-of-way and hauling of pipe sections are handled by motor transport PMK. Organization of new structural subdivisions has made it possible successfully to accomplish a large volume of work. The main administration specified measures ensuring completion of line work in the first quarter. Five additional spreads were established with internal reserves. Procedures have been devised for testing finished sections, installing block valves and bypass lines, and corrosion control devices. The main administration's workforce has pledged to complete in April-May its assigned sections of the export pipeline.

A. A. Gerdt, chief engineer at Glavsibtruboprovodstroy, noted that in order to achieve successful completion of a 729 kilometer section of the Urengoy-Pomary-Uzhgorod pipeline by the administration in the second quarter of the year, it was necessary to increase the number of spreads to 12, while the welding rate should increase to 10 kilometers per day.

A. M. Zakharov, chairman of the Kuybyshevtruboprovodstroy Trust's united construction committee, stated that the cost-accountable combined spread operating on a uniform work schedule and producing completed construction has confirmed its viability. The spread headed by Comrade Mikhel'son has reached a gas pipeline construction rate of 200 kilometers per year, which significantly exceeds the average "stride" in the industry. There is no doubt that with proper organizational and technical preparation, an annual performance figure of 200 kilometers will be achieved by the majority of the industry's combined pipeline construction spreads. Socialist competition is of mobilizing significance for boosting the work pace. A. M. Zakharov shared acquired experience in organizing competition according to the "work relay" principle on the Urengoy-Pomary-Uzhgorod pipeline right-of-way. Such competition is held on a contractual basis between all related brigades participating in construction of the natural gas pipeline, under the slogan: "Each workday -- 1 km of completed pipeline." The trust devotes considerable attention to publicizing competition. Competition results are communicated to all subdivisions. The unified construction project committee is doing a great deal to improve living conditions and provide cultural services to the construction workers on the export natural gas pipeline, which is having a positive effect on production performance.

An important factor in boosting the pace of construction of the pipeline is precision-coordinated involvement of construction workers from the CEMA member countries in the overall rhythm of the project.

A. I. Sorokin, USSR deputy minister of construction of petroleum and gas industry enterprises, stated that construction organizations from the GDR, and in part from the People's Republic of Bulgaria, Czechoslovakia, and the Polish People's Republic, are presently working on the Urengoy-Pomary-Uzhgorod pipeline. GDR representatives at the deployment locations erected seven of their own temporary communities with all services. They immediately proceeded to erect apartment buildings for operating personnel. The Poles built four compressor stations. The Yugoslavs have been invited for the first time to perform similar work.

A great many specialists from the nations of the socialist community are working on building oil and gas industry facilities in the USSR. At the same time a large number of Soviet construction workers are employed abroad. Thus we on the one hand are taking measures to export construction, and on the other hand we are importing construction capabilities for the performance of work here at home, noted A. I. Sorokin. Our specialists abroad have performed contractual obligations totaling more than 1 million rubles. The work has been of high quality. All facilities abroad are as a rule constructed on terms of general contractor "turnkey" projects. This method should be more extensively employed on construction jobs in the Soviet Union. In coordinating the activities of international construction workforces on the Urengoy-Pomary-Uzhgorod pipeline, we must utilize wherever possible the wealth of experience of the CEMA member nations which built the Soyuz natural gas pipeline.

Shortening the time required to build compressor stations and intensive development of the Urengoy gas field is a mandatory condition for ahead-of-schedule movement on-line of the Urengoy-Pomary-Uzhgorod natural gas pipeline. Glavurengoygazstroy has been given tough targets for 1983: not only to increase construction volume but also to improve utilization of funds, forms and methods of achieving these construction volumes. Glavurengoygazstroy chief A. I. Nalivayko noted that in order to accomplish these targets the main administration's workforces have analyzed 1982 performance results in a businesslike manner and have determined their own errors of omission, mistakes, and have specified concrete measures to correct them. The general contractor trusts have devised, jointly with clients and subcontractor organizations, measures to achieve a priority construction rate on natural gas processing plants 9 and 10. Material and technical resources are being concentrated at the sites of these plants. The main administration has largely completed preparatory-period work at the Urengoyskaya and Pravokhettinskaya compressor stations, which are coming on-line in 1983. The workforce of the Nadymgazpromstroy Trust, having examined its capabilities, has adopted tougher pledges -- to bring the Pravokhettinskaya compressor station into operation by the 66th anniversary of the Great October Revolution.

The status of construction at the Urengoy field was analyzed by USSR Deputy Minister of Gas Industry A. N. Kolotilin. He noted that major reserve potential for further boosting the level of industrialization of construction is to be found in improving the designing of gas-field facilities. The design of UKPG-11 [Natural Gas Processing Plant-11] is the most efficient. A. N. Kolotilin also discussed matters pertaining to provision and storage of equipment. Delivery of equipment to the compressor stations will for the most part be completed in the first half of the year. It is very important to conduct construction of the export natural gas pipeline in coordination with construction of housing and cultural-services facilities.

The tasks of Glavneftegazmontazh pertaining to installing facilities in the Urengoy gas field and installing gas compressor units and process equipment at export trunk pipeline compressor stations were covered in the presentation by L. V. Il'in, head of this main administration. He pointed to the principal directions being taken for boosting the pace of installation work at compressor stations. These include, first and foremost, centralized fabrication of piping, further mechanization of welding operations, standardization of

engineering design solutions for compressor station process layouts, rigorous observance by the client of specified equipment delivery schedules, shortening of the time required to erect auxiliary structures and accelerated installation of heat, power, and water supply systems, lubrication systems, etc. It is important adequately to provide machinery installation components with special tools, to improve organization of installation crew labor at compressor stations, to increase personnel job skills, plus a number of other factors.

M. G. Sabirov, chief of the Tatneftestroy Association, discussed progress in construction of the Pomarskaya and Sechenovskaya compressor stations on the export natural gas pipeline. The tasks assigned to Sibkomplektmontazh pertaining to construction of compressor stations on the Urengoy-Pomary-Uzhgorod pipeline were covered in the presentation of N. M. Ganichenko, the association's first deputy general manager.

All industries, particularly machine building, ferrous metallurgy, chemicals, and the transport ministries are taking part in resolving problems connected with building the Urengoy-Pomary-Uzhgorod pipeline. Local party, soviet, trade union, and Komsomol organizations are giving invaluable assistance to this most important construction project.

V. T. Sedenko, chairman of the Central Committee of the Trade Union of Oil and Gas Industry Workers and chairman of the All-Union Central Trade Union Council coordination council on the Urengoy-Pomary-Uzhgorod natural gas pipeline, who spoke at the end of the session, discussed the activities of the committees of the industry trade union pertaining to development of socialist competition, dissemination of advanced know-how, and provision of requisite housing and cultural-services conditions for the construction crews working on the export natural gas pipeline. The trade union central committee passed a resolution calling for the establishment of unified trade union organizations in the combined spreads, with representatives of trade union organizations at the compressor station construction complexes.

A big job is being done by the coordination council established under the All-Union Central Trade Union Council to unite the efforts of adjacent workforces, engaged in building the trunk natural gas pipelines of the 11th Five-Year Plan. Cultural patronship over the central construction projects of the five-year plan has been established. Much has been done to improve medical services for workers residing in the field camps. Much attention has been focused on creating safe working conditions. Commissions to inspect safety equipment and procedures are regularly dispatched to crews working on construction projects of major importance. Technical labor inspectors are assigned to each construction area. The tasks of the trade union committees are to ensure the requisite level of organizational, mass indoctrination and political work. The socialist pledges adopted by the industry's workforces for 1983 are very complex and difficult; they will require maximum effort and productive energy at each work station.

The results of the expanded session of the ministry board and trade union central committee were summarized by USSR Minister of Construction of Petroleum and Gas Industry enterprises B. Ye. Shcherbina.

One of the main organizational tasks consists in completing measures to establish combined pipeline spreads and to improve the economic management mechanism. Toughening and testing of the knowledge of engineers and young people will take place in the crucible of these activities, stated B. Ye. Shcherbina. This is a correct personnel policy for the future. It is extremely important to implement ahead of schedule the concept proper within the mechanism of management of construction.

It is essential to strengthen labor, production discipline and verification. It is important to concentrate attention on executive discipline. This is not an abstract theme but rather a realistic task, for the accomplishment of which we have both knowledge and resources. It is a serious business to improve organizational activity and indoctrination work. We must seek to ensure that each and every individual bears responsibility for the timetables specified by socialist pledges.

Everybody is well aware of the importance of the Urengoy-Pomary-Uzhgorod natural gas pipeline. There is no construction project like it anywhere in the world. Every day our industry reports to the nation the status of construction of this pipeline. The daily pace of work on this pipeline should be substantially increased. Wherever there are individuals of initiative who are capable of solving many problems, the specified schedules can be met, stressed B. Ye. Shcherbina.

The board of Minneftegazstroy and the presidium of the trade union central committee issued an extended resolution.

The officials of main administrations, associations, trusts, organizations, and enterprises of the ministry, republic, kray, oblast and city trade union committees were instructed to concentrate without delay the requisite material and technical resources on Urengoy-Pomary-Uzhgorod natural gas pipeline facilities, to concentrate the attention of workforces on meeting the adopted socialist pledges. Meeting daily and monthly construction schedules should have the inalterable force of law for each and every subdivision. A most important organizational measure is conversion of all spreads to operations according to a unified work order, utilizing the Shchekino method, the brigade contract, and transition by the construction project as a whole to around-the-clock operations and a continuous week.

The ministry board and presidium of the trade union central committee approved the initiative of the workforces of Glavvostoktruboprovodstroy, Glavukrneftegazstroy, the Soyuzpodvodtruboprovodstroy and Sibkomplektmontazh associations, the combined spreads headed by comrades Mikhel'son, Rekoshetov, Tsay, Belyayeva, and Gubitskiy, as well as the Surgut Building Construction Combine of Glavzapsibzhilstroy calling for ahead-of-schedule completion of the Urengoy-Pomary-Uzhgorod natural gas pipeline and other major completion-targeted facilities, successful fulfillment and overfulfillment of plan targets, and improved work efficiency and quality. All-out support should be given to the appeal issued by leading construction workers on export natural gas pipeline compressor stations -- to enter the combined socialist competition of subcontracting organizations according to the "work relay" principle, to achieve accelerated construction and completion of these facilities. In disseminating patriotic initiatives it is essential to ensure conditions for fulfilling

counterplans and socialist pledges, publicity to competition, totaling of competition results on a regular basis, with more extensive utilization of moral and material incentive measures.

The resolution specified concrete targets for workforces. Glavsibtruboprovodstroy, Glavvostoktruboprovodstroy, Glavtruboprovodstroy, Glavyuzhtruboprovodstroy, Glavukrneftegazstroy, and the Soyuzintergazstroy Association have been instructed to advance to a rate of 38-39 kilometers per day on construction of the export natural gas pipeline and to ensure stage-by-stage completion of sections by the deadlines specified by pledges. Work is to be completed in June on the Carpathian section of the pipeline. Measures should be taken to beef up construction on the GDR and Polish People's Republic sections. It is essential that underwater pipeline crossings be built on schedule, ensuring stage-by-stage movement of pipeline sections on-line. Construction of power transmission lines and microwave relay stations along the pipeline should be completed simultaneously with completion of the pipeline sections.

The appropriate main administrations, associations, and trusts have been instructed to engage in a broad front in building compressor stations along the Urengoy-Pomary-Uzhgorod natural gas pipeline and to ensure ahead-of-schedule completion of the compressor stations in conformity with pledges.

The resolution specifies measures to speed up delivery of pipe, valves, weights, requisite materials and equipment.

The board instructed the officials of main administrations, associations, trusts, and the State Construction Quality Inspectorate to implement measures to achieve further improvement of work quality and to increase reliability of the facilities being constructed. Special attention should be focused on quality of welding operations in welding bypass lines into the line, end connections, repairs welds, and other weld-ins. There must be a greater extent of inspection of welds by radiographic methods, and field laboratories must be provided with the requisite number of flaw detector operators. We must improve the quality of excavation, coating, wrapping and lowering-in operations. Pipelines must be placed precisely to the specified elevations, especially at crossing sites, extensively utilizing verification by instrumentation. It is essential to ensure that coating and wrapping are not damaged on yard coated and wrapped pipe, and that pipelines are properly ballasted.

It is necessary strictly to observe process and production discipline and to create conditions for labor safety, especially when working in the vicinity of operating pipelines, power transmission lines, and utility lines.

A task has been assigned -- to ensure execution of measures to improve the economic management mechanism, to strengthen plan and financial discipline, to observe rigorous economy in utilization of material and technical resources, and to increase return on capital and production profitability. A resolute effort should be made to correct deficiencies in providing services and medical care to construction workers and in organizing trade and public food service.

The ministry board and trade union central committee presidium expressed confidence that the workforces of this industry's organizations and enterprises, increasing their political and labor activeness, will extensively engage in socialist competition, will complete construction of the Urengoy-Pomary-Uzhgorod natural gas pipeline ahead of schedule and with excellent quality, and will do everything necessary to achieve successful fulfillment of plan targets for 1983 and the five-year plan as a whole.



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ENERGY CONSERVATION

## STATE COMMITTEE FOR SCIENCE AND TECHNOLOGY REVIEWS CONSERVATION

Moscow EKONOMICHESKAYA GAZETA in Russian No 26, Jun 83 p 2

/Article by Department of Power and Electrification of the USSR State Committee for Science and Technology: "Review: A Program for Energy Conservation"/

/Text/ The USSR Energy Program, which was developed for the long-term future, gives great importance to the conservation and better use of energy resources. The USSR Energy Program, which is directed at improving the structure of the nation's energy balance, stipulates in particular measures for creating a reliable system for conserving energy and resources.

At the present stage in the development of the Soviet Union's national economy the rational expenditure of fuel and energy resources (TER) is of great importance. This is the case primarily because the further growth in the extraction and production of fuel and energy is requiring increasing amounts of capital investments, material and labor resources. At the same time the relative expenditures for accomplishing energy conservation measures are two to two and half times less as compared with expenditures for an equal growth in the production of energy resources.

The growth in the production of equipment that enables us to utilize recycled energy resources in the metallurgical and other sectors of industry was stipulated in the decisions of the 26th CPSU Congress. The Party and the government have simultaneously noted the need to extensively implement scientific-technical achievements aimed at economizing and raising the efficiency of using fuel and energy. The USSR Ministry of the Fruit and Vegetable Industry, the USSR State Committee for the Supply of Production Equipment to Agriculture, the USSR Ministry of Agriculture, the USSR Ministry of Power and Electrification, the USSR Ministry of the Gas Industry, the USSR Ministry of Geology, and the councils of ministers of the union republics have been tasked to come up with a set of measures in the years 1983 through 1990 that will enable them to make use of the waste heat of gas compressor, atomic and thermal electric power stations in the agricultural sphere,

primarily to heat greenhouses. The ministries and departments have been given specific assignments for using recycled energy resources.

The scientific-technical program to "develop and adopt new methods and technical solutions for the highly efficient utilization of fuel, electric power and heat and recycled energy resources in industry and to create optimal systems for the reliable and efficient supply of energy to industrial enterprises", which is being realized in the 11th Five-Year Plan, is to play an important role in this effort.

At Each Enterprise

By secondary, or recycled, energy resources (VER) we mean the energy potential of product, wastes, by-product and intermediate products, which are formed in technological assemblies (installations and processes), which is not used in the assembly itself, but which can be partially or completely used to provide energy to other assemblies (processes).

Combustible (fuel) VER include by-product combustible gases from melting furnaces (blast furnaces, converter and charge furances, etc.), combustible wastes from chemical and thermochemical processes for refining carbon and hydrocarbon raw materials, wastes not used or suitable for additional technological refining (chips, sawdust, shavings), the liquors created in the production of celluose and paper, and so forth.

Heat VER include the physical heat from the waste gases of technological assemblies, the physical heat and by-products, the heat from working mediums of forced cooling systems of technological assemblies, the heat from hot water and steam which are generated in technological and power installations.

The total annual output of heat VER equals approximately 280 to 300 million tons of conventional fuel. This includes 45 percent which comprises low-potential heat, for which there is at present almost no economically feasible technical solutions for making use of it. The use of high-potential VER results in the conservation of 20 million tons of conventional fuel per year.

The percentage of combustible VER that is put to use is considerably higher. In 1982 some 36 million tons out of 38.6 million tons of conventional fuel were utilized.

In particular the Energy Program calls for the development of efficient units for the production of industrial carbon by making use of as many recycled energy resources as possible. Each of these units will provide an annual savings of 22,000 tons of conventional fuel. The program also calls for the development of equipment with improved reliability and economy features for a sulphuric acid plant capable of producing 500 tons every 24

hours, which make greater use of VER. The adoption of such a unit will make it possible to come up with a 5-fold reduction in losses of heat into the atmosphere. The fuel savings obtained by adopting a single equipment set such as this will amount to 7,500 tons of conventional fuel.

Heating and heat-treating furnaces are being used in almost all sectors. Energy losses in existing furnace designs are great, in some cases reaching 70 to 80 percent. In accordance with the Energy Program unified automated and mechanized gas furnaces and drying kilns, which have efficient thermal layouts, gas-jet devices and recuperative heat exchangers will be replacing these units.

Thus the adoption of unified furnaces for heating metal prior to forging is making it possible to reduce the expenditure of natural gas by 15 to 20 percent. Large automated furnaces with a hearth that can be wheeled out are making it possible to conserve some 30 to 40 percent of this fuel.

Searching for Optimal Variants

Optimizing the processes of combustion and heat mass exchange (cyclone, in a weighted layer, and so forth) is a key problem in various technological units and installations. Moreover in several instances, as regards the energy and technological savings and a substantial reduction in capital expenditures, there is a reduction in the harmful effects upon the environment. The Energy Program includes several assignments for creating cyclone assemblies, including a single series of cyclone and other types of furnaces for burning sulphur, fuel and wastes in boilers, kilns and other installations with a capacity of .5 to 50 gigacalories per hour.

A special section of the program is devoted to the efficient use of equipment and technical solutions in this field. A great deal of importance is attached to the installation of recovery boilers at the Chimkent Production Association "Fosfor". Each of these boilers will be capable of conserving nearly 17,000 tons of conventional fuel. Other production facilities are to be equipped with similar assemblies as the result of this.

Scientific-research work is in progress to study new methods and devices for cleaning the heat exchange surfaces of power and recovery equipment of deposits, which will increase its efficiency. Rational ways to make use of waste gases from the production of industrial carbon are being adopted, as are heat exchange equipment with thermal pipes and other new ideas.

The use of exhaust heat from gas compressor stations can be viewed as a significant reserve for conserving fuel in the gas industry. The experience obtained in the Ukrainian SSR and in several other regions of the Soviet Union attests to this. The Energy Program calls for the introduction of units which use the recycled heat of gas compressor stations at the Kalach, Yakhroma and Kungrad stations to meet the needs of hot house combines.

Unfortunately, on the whole the adoption of this efficiency measure is proceeding very slowly. Thousands of tons of standard fuel are being expended to heat hothouses by burning gas rather than by using the exhaust heat from gas compressor stations. The USSR Ministry of the Gas Industry (Deputy Minister S. Kashirov) deserves reproach on this score.

Several assignments of the Energy Program are aimed at the creation of rational and reliable designs for distribution devices, air circuit breakers, transformers and multipurpose devices for increasing the quality of the electric power supply for enterprises. We are also speaking of high-speed devices for the static and dynamic compensation of the reactive power of industrial power transducers and other equipment. A significant amount of attention has been given to systems which provide optimal control over the modes of power consumption at plants and factories.

The development of optimal layouts for power supply and power consumption by industrial complexes is an essentially new trend in energy conservation. The need to conduct this kind of work came about because of the fact that the most rational layout for the expenditure of fuel and energy at one enterprise often does not coincide with the best variant for an entire group of production facilities. For the most part this touches upon the efficiency of the structure of external ties, increasing the extent to which VER is used, improving the layouts for the power supply, optimizing the power consumption modes, selecting efficient power carriers, and protecting the environment.

One assignment has to do with the development of recommendations for improving the layouts of power supply and power consumption at large industrial centers, including those in Minsk, Novopolotsk, Sverdlovsk, Zhdanov, Almalyk, Ivanovo, and Leningrad. The experience of the VNIPIenergoprom /All-Union Scientific Research and Design Institute of the Power Industry/ has shown that such work can yield significant economic savings.

Large Reserves for Conserving

Estimates demonstrate that the total savings in fuel and power resources from just adopting technical developments called for in the Energy Program (and this is far from being everything that can be done) will amount to more than five million tons of standard

fuel in 1985 and 16 million tons by 1990. This major addition to the slightly more than 50 million tons of thermal and combustible VER that are now being consumed can be obtained, of course, by fulfilling all of the assignments that have been handed out. However, not all of those involved have the proper attitude toward this very important matter.

For example, the USSR Ministry of Ferrous Metallurgy (Deputy Minister A. Borisov) has not fulfilled stages of two assignments having to do with technical documentation for the installation of a unit that captures the waste gas from a 350 ton capacity assembly and for the development of an experimental-industrial installation that uses the excess pressure and physical heat of blast furnace heat.

In the USSR Ministry of Nonferrous Metallurgy (Deputy Minister V. Boroday) the question regarding the use of heat from the ventilation exhausts from the mines and shops at the Norilsk Mining and Metallurgical combine has not been solved once and for all. The solution proposed by the Moscow Power Institute is not being supported within the USSR Ministry of Nonferrous Metallurgy; and its new variants are not being advanced by the ministry. It would seem that the USSR Ministry of Nonferrous Metallurgy should reexamine the proposal of the Moscow Power Institute by calling in specialists in this field.

We must confess that the utilization of a large amount of recycled energy resources has been poorly organized. In many instances no provision is made for using recycled energy resources in the designs that are being developed for enterprises. The Main Administration of State Experts of the USSR State Committee for Construction Affairs must display more adherence to principle in this.

Frequently the technical means which have already been manufactured are not being put to use.

At the start of this year there were some 45 recovery boilers that were not being used within the USSR Ministry of Petroleum Refining and Petrochemical Industry; in the USSR Ministry of the Chemical Industry there were 23; and in the USSR Ministry of Ferrous Metallurgy there were 15. The Norilsk Mining and Metallurgical Combine received a recovery boiler in 1976, but it still has not been installed. The Novokuznetsk Aluminum Plant received a recovery boiler in 1980, but it is not going to be installed until 1985.

The lead institutes for this program are VNIPIenergoprom of the USSR Ministry of Power and Electrification and VNIPItyazhpromelektroproyekt /All-Union Scientific Research and Planning Institute for the Design of Enterprises for the Heavy and Power Machine Building Industry/ of the USSR Ministry of Installation and Special Construction Work. They have completed a significant amount of

work in formulating the program and carrying out the assignments, for which they are the executors. However, within the VNIPIenergoprom they still have not organized a system for monitoring progress of the ministries and departments and other organizations in carrying out the assignments and stages of the Energy Program. The USSR Ministry of Power and Electrification should establish within the VNIPIenergoprom a group for monitoring the program and organize a service for studying the enterprises and industrial centers and develop recommendations for improving the consumption of energy within them. The institute has tremendous need of an experimental production facility for creating lead models of energy conservation equipment that can be used throughout industry.

All of these questions can be solved in the near future. The sooner they can eliminate the shortcomings, the more successfully they can fulfill the stages and assignments of the program and the more significant will be the success, the more energy resources will be made available for circulation.

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